NASA SP-7011 (52)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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NASA SP-7011(52)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA Information System during June, 1968.

Scientific and Technical Information Division
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. JULY 1968

INTRODUCTION

Aerospace Medicine and Biology is a continuing bibliography which, by means of periodic supplements, serves as a current abstracting and announcement medium for references on this subject. The publication is compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and NASA. It assembles, within the covers of a single bibliographic announcement, groups of references that were formerly announced in separate journals, and provides a convenient compilation for medical and biological scientists. Additional background details for this publication can be found in the first issue, NASA SP-7011, which was published in July, 1964. Supplements are identified by the same number followed by two additional digits in parentheses.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis will be placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion. The contents of this issue are comprised of abstracts that were prepared by the three contributing organizations.

Each entry consists of a standard citation accompanied by its abstract. It is included in one of three groups of references that appear in the following order:

a. NASA entries identified by their *STAR* accession numbers (N68-10000 series);
b. AIAA entries identified by their *IAA* accession numbers (A68-10000 series); and
c. LC entries identified by a number in the A68-80000 series.

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U.S. Government Printing Office (GPO)
Washington, D.C. 20502

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Washington, D.C. 20546.

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(continued)

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All articles listed are available from the American Institute of Aeronautics and Astronautics, Inc. Individual and Corporate AIAA Members in the United States and Canada may borrow publications without charge. Interlibrary loan privileges are extended to the libraries of government agencies and of academic nonprofit institutions in the United States and Canada. Loan requests may be made by mail, telephone, telegram, or in person. Additional information about lending, photocopying, and reference service will be furnished on request. Address all inquiries to:

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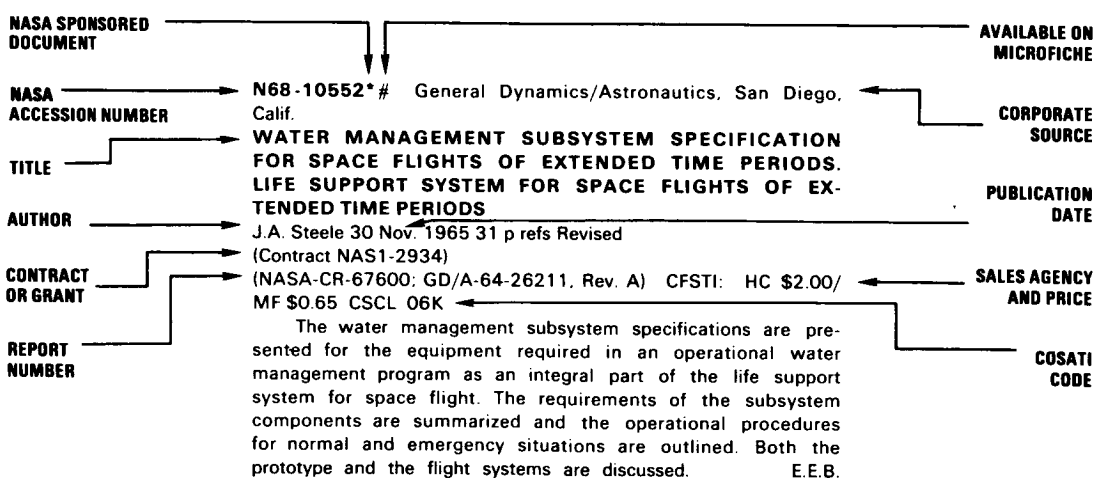
TYPICAL CITATION AND ABSTRACT



AEROSPACE MEDICINE AND BIOLOGY

a continuing bibliography JULY 1968

STAR ENTRIES

N68-20582 California Univ., Berkeley.
THE QUANTUM CONVERSION PROCESS OF PHOTOSYNTHESIS. PARAMAGNETIC RESONANCE OF TRANSITION METAL COMPLEXES HAVING BIOLOGICAL INTEREST
Robert Talman Ross (Ph.D. Thesis) 1966 118 p
Available from Univ. Microfilms: HC $5.80/MF $3.00 Order No. 67-5152

On the basis of an efficiency argument, it is hypothesized that there should be a linear relationship between the net flow through a biochemical pathway and the free energy lost per unit flow. This hypothesis is compatible with the observed light saturation behavior of photosynthesis. Preliminary extension of this model to include transient behavior correctly predicts the 1/time decay of chemiluminescence observed in plants. The problems and techniques involved in the EPR spectroscopy of transition metals are reviewed, and the literature on the EPR of metal complexes which has biological significance is surveyed. Particular emphasis is placed on the conditions necessary for the observation of paramagnetic resonance, and on the EPR of manganese. Dissert. Abstr.

N68-20600# Junta de Energia Nuclear, Madrid (Spain). Seccion de Isotopos.
FOOD PRESERVING BY IRRADIATION. PART 5. ECONOMIC STUDY OF THE POTATO MARKET IN SPAIN AND THE FEASIBILITY OF PRESERVATION BY IRRADIATION [CONSERVACION DE ALIMENTOS POR IRRADIACION, 5: ESTUDIO ECONOMICO DEL MERCADO DE PATATAS EN ESPANA Y POSIBILIDADES DE SU CONSERVACION POR IRRADIACION]
A. Rivas, A. Garcia de Mateos, N. Ortin Sune, and M. del val Cob Apr. 1967 41 p refs In SPANISH; ENGLISH summary (JEN-184-SI/I-17, Pt. 5) CFSTI: HC $3.00/MF $0.65

A study of the Spanish potato market is carried out in order to know the possibilities of preservation by irradiation. The study is initiated with a compilation of statistical data on the production and consumption of potatoes by regions and seasons. Last years losses are then estimated. In order to evaluate the monthly consumption, two ideal standard markets have been established, being the price differences between the highest and lowest demand months of five arbitrary units. From these, a medium standard market is proposed. This situation would be reached when better preservation means were practized. In this medium market the price differences would be three. It is concluded that about 0.1×10^6 ton of potatoes could be irradiated in Spain along a period of 5.5 months. Author (ESRO)

N68-20610 Rutgers Univ., New Brunswick, N. J.
STUDIES ON MEMBRANE ASSOCIATED PROTEIN SYNTHESIS
Lolita Daneo Moore (Ph.D. Thesis) 1966 193 p
Available from Univ. Microfilms: HC $8.80/MF $3.00 Order No. 67-5272

A system derived from cell-free extracts of *Streptococcus faecalis* was used for studies of amino acid incorporation into proteins. This system is capable of sustained and substantial protein synthesis over a period of several hours. Examination of various extract fractions failed to give any evidence of soluble "ribonucleases." In centrifugal fractions of the particulate material, sustained protein synthesis in a completely supplemented system was a function of the membrane content of the fraction. A membrane associated subunit active in protein synthesis was isolated by sucrose gradient centrifugation. The active subunit contained membrane fraction rich in ninhydrin positive phosphatides, a membrane bound polynucleotide phosphorylase, membrane bound 50s ribosomal subunits, and 30s ribosomal subunits associated with RNA. Disruption of membrane integrity chemically or enzymatically resulted in dissociation of the active subunit, accompanied by a reduction of protein synthesis from a sustained reaction, to one limited to 20–45 minutes. Dissert. Abstr.

N68-20663 Texas Univ., Austin.
THIN FILM SENSORS OF MICRON SIZE AND APPLICATIONS IN BIOTHERMOLOGY
Ray Paul Reed (Ph.D. Thesis) 1966 211 p
Available from Univ. Microfilms: HC $9.70/MF $3.00 Order No. 67-3343

New methods of controlling the geometry of functional thin film deposits by vapor deposition onto filamentary substrates are described. A variety of junction and multiterminal configurations useful for miniature electrophysical devices can be produced by this means. Examples are multiple sensors on a single slender probe and sensors with active regions confined to micron-order dimension. The concept was demonstrated by producing temperature sensors as small as 1 micron diameter. An analysis of transient temperature response for embedded sensors of this class was made in the context of application to the measurement of temperatures in living systems. Dissert. Abstr.

N68-20690# School of Aerospace Medicine, Brooks AFB, Tex. Biosciences Branch.
A DYNAMIC FLOW GASSING CHAMBER FOR TOXICOLOGY STUDIES WITH SPECIAL REFERENCE TO ITS USE WITH NO_2, SEPTEMBER 1964–APRIL 1967

William E. Britz, Jr., John L. Steele, Charles E. Dasher, and August R. Banknieder Sep. 1967 19 p refs Submitted for publication
(SAM-TR-67-80; AD-665844)

To test the toxicity of nitrogen dioxide/nitrogen tetroxide and other gases, it was necessary to construct an exposure chamber for small laboratory animals. This report describes the construction and operation of a small dynamic flow gassing chamber for studying toxic gas inhalation. Special attention is given to its use with NO2/N2O4 and the system for monitoring the concentration of gas. Several accessories for the chamber include a special harness for monitoring chest sounds of the subjects being gassed; a system for endotracheal intubation for allowing the subject to breathe the gas concentration, while being manipulated surgically outside the chamber; and, a small by-pass chamber for small laboratory animal species being utilized in timed-dose studies.
Author (TAB)

N68-20743# School of Aerospace Medicine, Brooks AFB, Tex. Biodynamics Branch.
MOL: CREW PERFORMANCE ON DEMANDING WORK/REST SCHEDULES COMPOUNDED BY SLEEP DEPRIVATION
Bryce O. Hartman and George K. Cantrell Nov. 1967 34 p refs
(SAM-TR-67-99; AD-665845)

Thirteen subjects took part in a series of 12-day runs in an experiment on the effects of demanding work/rest schedules (4/2, 4/4, or 16/8 hours). On days 8, 9, and 10, subjects were deprived of sleep and worked continuously. No significant work/rest effects were seen until subjects were sleep-deprived. In general, subjects on the 16/8 schedule tolerated sleep deprivation better and recovered faster, as evidenced by psychomotor test scores and sleep reports.
Author (TAB)

N68-20753# Dunlap and Associates, Inc., Santa Monica, Calif.
TECHNIQUE FOR ESTABLISHING PERSONNEL PERFORMANCE STANDARDS (TEPPS) PROCEDURAL GUIDE
Meredith B. Mitchell, Russell L. Smith, Ronald A. Westland, and Robert E. Blachard Jan. 1968 144 p refs Second Edition
(Contract Nonr-4314(00))
(AD-665689)

The report is a procedural guide for the application of a Technique for Establishing Personnel Performance Standards (TEPPS). It specified the types of input data required, provides instructions and examples on how to proceed through the various steps in TEPPSs application and includes guidelines for interpretation of results. The TEPPS computer program procedures also are discussed along with instructions for use.
Author (TAB)

N68-20795# Vermont Univ., Burlington. Div. of Anesthesia.
A COMPUTERIZED METHOD FOR INSTANTANEOUS AND CONTINUOUS MEASUREMENTS OF EXPIRED NITROGEN Final Report, 1964–1966
John Abajian, Jr., Tamotsu Shinozaki, John S. Hanson, and Burton S. Tabakin Wright-Patterson AFB, Ohio AMRL Sep. 1967 68 p refs Prepared in cooperation with State Agriculture Coll.
(Contract AF 33(615)-2262)
(AMRL-TR-67-77; AD-665873)

The basis for the on-line study of pulmonary nitrogen washout by hybrid computer is presented. The instrument produces a semilogarithmic plot of nitrogen concentration in expired gas versus cumulative alveolar ventilatory volume. Simultaneous measurements of functional residual capacity and main conducting airway volume are also recorded. Comparison of conventional washout methods and computer technique proved the validity of the computer. Secondly, a new index of intrapulmonary gas distribution is devised. The index (IDI or Inspired Gas Distribution Index) is quite sensitive to any change of the gas distribution in the lung and has a very small physiological variation (1.8 plus or minus 0.2). As one application of this computer in research, the effect of expiratory obstruction in normal subjects is studied. A 5 mm. diameter obstruction does not affect the gas distribution in the supine position, whereas the obstruction has a striking effect on gas distribution when a subject is exercising in the upright position.
Author (TAB)

N68-20900# School of Aerospace Medicine, Brooks AFB, Tex.
OBSERVATIONS ON THE EFFECTS OF DECABORANE AND SEVERAL POTENTIAL ANTIDOTES IN THE RAT
Lloyd L. Foster and Walter N. Scott Oct. 1967 19 p refs
(SAM-TR-67-103; AD-665838)

Rats were injected intraperitoneally with decaborane (B10H14) and observed over a seven-day period to determine their toxic reactions, including death rate. Pyridoxine, pyridoxal, and pargyline (MO-911) were tested in the decaborane-treated rats as antidotes for the observed manifestations of the boron hydride injection. In these studies pyridoxine (1 mmole/kg.) given simultaneously with decaborane prevented the convulsions and hyperactivity usually seen in rats treated with decaborane alone (20 mg./kg.) and caused a significant decrease in the number of deaths. Pargyline, 50 mg./kg., given with the decaborane gave no significant alteration of the CNS symptoms, but significantly reduced the mortality rate. Pyridoxal phosphate and a higher level of pyridoxine (2 mmoles/kg.) were without beneficial effect. Some implications of the data are discussed.
Author (TAB)

N68-20919# Naval Air Development Center, Johnsville, Pa. Aerospace Medical Research Dept.
SURVIVAL OF RATS EXPOSED TO 10 PSIA OXYGEN TO FURTHER EXPOSURE AT ONE ATMOSPHERE OXYGEN
George H. Kydd 29 Dec. 1967 51 p refs
(NADC-MR-6714; AD-665675)

A rather sharp difference in the effects of exposure to 100% oxygen occurs at around 600 mm Hg PO2 in that pressures slightly higher cause death in most small laboratory animals whereas most animals survive slightly lower pressures. The present experiments were designed to indicate whether there is a relationship between exposures at the lower and higher pressures. The results show that a large percentage of rats pre-exposed at 516 mm Hg (2/3 atmosphere) survive subsequent exposure at PO2 of one atmosphere (714 mm Hg) indicating that a non-additive relationship exists.
Author (TAB)

N68-20923# School of Aerospace Medicine, Brooks AFB, Tex.
STUDIES ON FROZEN FOIL PACK MEAL COMPONENTS, 15 JUNE 1966–25 MAY 1967
Robert K. Nelson, Jack R. Audiss, Raymond A. Madson, Joseph T. Cordaro, Norman D. Heidelbaugh et al Sep. 1967 23 p refs
(SAM-TR-67-84; AD-665847)

Components selected from the foil pack meal feeding system were prepared (cooked and packaged) in a foil pack kitchen, frozen, stored in the frozen state, and evaluated organoleptically and bacteriologically after storage for time up to 12 months. These foods were studied for usefulness in a frozen component feeding system offering a la carte selection at remote sites where prestocking of nonfrozen meal components is feasible. The results of this study indicate that the frozen foods were bacteriologically safe for consumption and, in general, organoleptically acceptable. Suggestions are offered for further development of this frozen component feeding system.
Author (TAB)

N68-20957# Systems Research Labs., Inc., San Antonio, Tex.
RESEARCH ON THE HUMAN PHYSIOLOGIC RESPONSE TO PROLONGED ROTATION AND ANGULAR ACCELERATION. A: ENGINEERING ACTIVITIES B: PHYSIOLOGIC ACTIVITIES

W. E. Rothe, Edward E. Pope, Samuel T. Lim, and John G. Fletcher Brooks AFB, Tex. School of Aerospace Med. Sep. 1967 155 p refs
(Contract AF 41(609)-2897)
(SAM-TR-67-69; AD-665849)

Physiologic research has explored the responses of humans to rotation and acceleration. The test vehicle was the Rotational Flight Simulator, an air bearing suspended sphere with unrestricted rotational freedom propelled by internally mounted inertia rings and, later, by a single axis external drive assembly. Engineering efforts established the dynamics and improved the control of the vehicle. Instrumentation was provided for the readout, display, and recording of significant data serving for physiologic evaluation and medical monitoring. The data were telemetered; pictorial display of the subject and two-way communication links were provided. A total of 138 experiments yielded valid physiologic and human performance information in a rotational environment from fractional to 16 rpm and for several minutes to a maximum of 30 minutes. The subjects consisted of 7 young, healthy males. Results indicated that the RFS properly used and instrumented represents a valuable and unique test vehicle; that changes in heart rate, and ECG readings depended on body position with respect to gravity; that electro-oculogram, subjective sensations, incipient nausea, and ability of the pilot to right the stationary sphere after tumbling--all depended on the rate, duration, and axis pattern of rotation. Author (TAB)

N68-21016# School of Aerospace Medicine, Brooks AFB, Tex.
HASTENING RESPIRATORY ACCLIMATIZATION TO ALTITUDE WITH BENZOLAMIDE, OCTOBER 1966–MAY 1967
Richard S. Kronenberg and Stephen M. Cain Oct. 1967 15 p refs
(SAM-TR-67-98; AD-665839)

A double-blind study involving 72 hours exposure to a pressure altitude of 14,000 feet (447 torr) was carried out on 23 subjects to ascertain whether benzolamide (CL 11,366) hastened respiratory acclimatization to altitude better than did acetazolamide, another carbonic anhydrase inhibitor previously investigated. Samples of arterial blood, plasma, and cerebrospinal fluid (CSF) were taken at 24 and 72 hours at altitude and analyzed for pH, PCO2, PO2, CO2 content, HCO3-, standard HCO3-, lactate, Na(+), K(+), and Cl(-). End-tidal PCO2, was measured frequently during waking hours, and CO2 response curves were measured daily. Three 24-hour urine collections were analyzed for Na(+), K(-), Cl(-), and 17-hydroxy-corticosteroids. Subjects filled out questionnaires to evaluate their subjective responses to altitude and were ranked by an observer according to their apparent state of well-being. Changes in physiologic variables were consistent with more rapid respiratory acclimatization, and the subjective data indicated that the drug was helpful in ameliorating acute altitude sickness. Benzolamide was not clearly better in either respect than acetazolamide. Author (TAB)

N68-21017# School of Aerospace Medicine, Brooks AFB, Tex.
DESIGN CRITERIA FOR THE SPATIAL ORIENTATION TRAINER, JANUARY–JUNE 1967
Kent K. Gillingham, Robert L. Cramer, Patrick J. Dowd, and Frederick G. Collins Oct. 1967 23 p refs
(SAM-TR-67-90; AD-665840)

Spatial disorientation continues to cause at least 4% of the aircraft accidents in the Air Force. At the USAF School of Aerospace Medicine, the Spatial Orientation Trainer has been designed to help eliminate such accidents. The more deadly of the vestibular illusions of flight (namely, the Coriolis illusion, the oculogravic illusion, and the graveyard spin) can be reproduced and used to stress the pilot while he is performing a simulated mission in the trainer. Such exposure gives him practice in overcoming the sensory conflicts that result in disorientation and practice in proper aircraft control in spite of disorientation. The methods by which the illusions of flight are to be produced and the criteria upon which effectiveness of the trainer is to be judged are discussed in detail. Author (TAB)

N68-21018# Army Natick Labs., Mass. Clothing and Organic Materials Div.
ADVANCES IN THE DEVELOPMENT OF HEAD PROTECTION FOR AIRCRAFT CREWMEN
Abraham L. Lastnik Feb. 1967 7 p
(TR-67-53-CM; AD-665388)

The U.S. Armys new nylon fabric laminate flight helmet provides increased crash and ballistic protection over that of other current U.S. military flight helmets. A newly developed retention device, based on an orthopedic sling for neck traction, assures retention of the helmet. A new visor of polycarbonate resin provides eye protection against impinging fragments. It resists shattering and penetration. Research studies reveal the feasibility of attenuating low frequency noise, at the ear, with relatively small volume ear cups. Author (TAB)

N68-21019# RAND Corp., Santa Monica, Calif.
A MODEL FOR CONTINUOUS NEUROELECTRIC AC ACTIVITY: THE ENCODING OF STIMULUS INTENSITY
R. J. MacGregor Feb. 1968 35 p refs
(P-3747; AD-665453)

The work applies the idea of large-amplitude depolarizations in dendritic regions to the intensity dependence of graded potentials in the vertebrate retina. The model assumes that membrane in dendritic regions of primary afferents is linear, that receptors excite primary afferents by a synaptic mechanism which is continuously active during stimulation, and that the magnitude of the permeability change depends linearly upon stimulus intensity. Comparison of the results with electrical data suggests that such a synaptic mechanism might represent the source of logarithmic intensity encoding. Psychophysical intensity data and possible applicability to other sensory modes are briefly discussed. Author (TAB)

N68-21024# Naval Applied Science Lab., Brooklyn, N. Y.
GLOSSARY OF RADIOMETRIC AND PHOTOMETRIC CONCEPTS USED IN RETINAL BURN AND FLASHBLINDNESS RESEARCH (DEFINITIONS, SYMBOLS AND UNITS) Progress Report
Willard Derksen and Neil Griff 23 Dec. 1967 19 p refs
(PR-18; AD-665790)

Radiometric and photometric concepts, symbols, units and definitions which are employed by the Naval Applied Science Laboratory in its retinal burn and flashblindness research are given. Author (TAB)

N68-21043 Missouri Univ., Rolla.
AERATION STUDIES IN SUBMERGED FERMENTATIONS USING A STEAM-STERILIZABLE DISSOLVED OXYGEN SENSOR OF IMPROVED DESIGN
Carl Justin Wallace (Ph.D. Thesis) 1967 199 p
Available from Univ. Microfilms: HC $9.00/MF $3.00 Order No. 67-60

A steam-sterilizable oxygen sensor of improved design was developed out of an investigation of several potential sensors. Use was made of the steam-sterilizable oxygen sensor for the determination of the effect of impeller speed and aeration rate on the absorption coefficient of a small, 5 liter pilot-plant fermentor. Amylase production by *Aspergillus niger*, glutamic acid production by *Brevibacterium divaricatum*, and gluconic acid production by *Pseudomonas fluorescens* were studied at various aeration efficiencies. It was found that for all fermentations, an increase in the aeration efficiency resulted in an increase in the rate of product formation as well as an increase in total yield. Since the effect of

dissolved oxygen on product formation by microorganisms was investigated, it was also of interest to determine the critical oxygen tension of these and other organisms. The critical oxygen tension of *Myrothecium verrucaria* and *Torulopsis utilis* was determined as was that of the three organisms previously mentioned. The critical oxygen tension for the bacteria, *B. divaricatum* and *P. fluorescens*, and yeast, *T. utilis*, was extremely low, while that of the fungus, *A. niger*, was high. *M. verrucaria*, although a fungus, exhibited a critical oxygen tension close to that of the bacteria and yeast. Dissert. Abstr.

N68-21059 Iowa State Univ. of Science and Technology, Ames.
THE EFFECTS OF LIGHTNING AND SIMULATED LIGHTNING ON TISSUES OF ANIMALS
James Raley Howard, III (Ph.D. Thesis) 1966 277 p
Available from Univ. Microfilms: HC $12.60/MF $3.60 Order No. 67-5596

Lightning-strike pathology in livestock with an evaluation of patho-physiologic responses to simulated lightning discharges in sheep and tissue culture cells. In 63 detailed necropsies of lightning fatalities, singed hair and skin were the only significant lesions caused by lightning. Characteristically the lymph nodes of the head and neck were congested and hemorrhagic, as were the lungs and brain. Microscopically these tissues were congested and hemorrhagic-appearing changes developed after death. Dissert. Abstr.

N68-21067*# Sandia Corp., Albuquerque, N. Mex. Planetary Quarantine Dept.
PLANETARY QUARANTINE PROGRAM Quarterly Progress Report, Period Ending 31 Mar. 1968
Mar. 1968 22 p refs
(NASA Order R-09-019-040; NASA Order H-13245A)
(NASA-CR-93966, QR-8) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Progress is reported for seven studies related to planetary quarantine procedures. An objective hierarchy is being constructed to determine what actions are needed to achieve planetary quarantine objectives on a cost optimal basis. Microbial death models are under consideration, and tests of model flexibility were carried out for data on the thermal sterilization of yeast. Information system design was considered for meeting both lunar and planetary quarantine responsibilities, and estimating and predicting microbial burdens of spacecraft surfaces is discussed. Attention is given to vacuum probe development in relation to removal of surface contamination for evaluation of microbial content, and random fine surface particles were studied. Preparation of a contamination control handbook is underway. M.W.R.

N68-21078*# Public Health Service, Phoenix, Ariz. Planetary Quarantine Unit.
SERVICES PROVIDED IN SUPPORT OF THE PLANETARY QUARANTINE REQUIREMENTS
M. S. Favero Apr. 1968 25 p
(NASA Order R-137)
(NASA-CR-93967; Rept.-21) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Various ecological investigations are underway, and a statistical analysis was completed of the probability of release of Bacillus subtilis var. niger spores from fracture lucite. Microbiological sampling of surfaces with a vacuum probe is described that uses a membrane filter capable of withstanding insonation and a shortened probe tip and conical section. Efforts were made to standardize the inoculation, storage, and transportation of stainless steel strips for use as split samples and as biological indicators of the effectiveness of ultrasonic baths. Studies were continued on the kinetics of dry heat inactivation of naturally occurring spore populations, as were studies concerning the use of ultrasonics for recovering microorganisms from surfaces. Microbial contamination detected on various surfaces of Surveyor 7 are being studied, as are contamination on Apollo spacecraft. M.W.R.

N68-21138# California Univ., Berkeley. Lawrence Radiation Lab.
STUDIES ON THE DICYANAMIDE MEDIATED SYNTHESIS OF DIPEPTIDES
Steven Gary Platt (M.S. Thesis) Dec. 1967 29 p refs
(Contract W-7405-ENG-48)
(UCRL-17936) CFSTI: HC $3.00/MF $0.65

An attempt to repeat the earlier research that showed DCA dicyanamide to be an effective mediator of glycine condensation was not successful, that is, the earlier glycine work was not reproduced. Several possible explanations are given for the discrepancy. A procedure was developed, after extensive theoretical and experimental investigation, that will allow for the answering of the research question on relative yields of 4 dipeptides in a DCA-mediated condensation reaction. That procedure is based upon the use of high-voltage paper electrophoresis and paper chromatography. It allows for the separation, and quantitative yield measurement, of the dipeptide reaction products of DCA mediated condensation occurring in a model system initially containing equal concentrations of two amino acids. The procedure was tested with the phenylalanine–glycine system, and found to successfully separate the four possible dipeptide products. Semiquantitative information concerning the yields of dipeptide were obtained for the DCA mediated condensation of the amino acids valine, leucine, and phenylalanine. NSA

N68-21139*# Stanford Univ., Calif. Dept. of Biochemistry.
STRUCTURE AND FUNCTION OF PROTEINS AND NUCLEIC ACID Progress Report, 1 Jul.–31 Dec. 1967
Lubert Stryer 31 Dec. 1967 4 p refs
(Grant NGR-05-020-137)
(NASA-CR-93963) CFSTI: HC $3.00/MF $0.65 CSCL 06A

In continuing research the conformation of pyridine nucleotide coenzymes β-DPN, β-DPNH, their isomers, analogues, and related model compounds were studied by optical rotary dispersion and circular dichroism measurements. The binding of azide ion to two mutant human ferrihemoglobins is reported, and the subunit interaction in tryptophan synthetase is briefly mentioned. Consideration is also given to triplet–singlet energy transfer which was exhibited by a complex of α-chymotrypsin and proflavin, a chromophoric inhibitor. B.S.D.

N68-21158# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
BAND ULTRACENTRIFUGATION TECHNIQUE FOR THE ANALYSIS OF MACROMOLECULES [IL METODO DELLA SEDIMENTAZIONE A ZONE PER L'ANALISI DI MACROMOLECOLE IN ULTRACENTRIFUGA ANALITICA]
L. Danusso and A. Reale Scafati 5 Oct. 1967 42 p refs In ITALIAN; ENGLISH summary
(ISS-67/33) CFSTI: HC $3.00/MF $0.65

The technique of band sedimentation in the analytical ultracentrifuge has been introduced recently for the study of macromolecular species. In the present report the principal features of this method are described, and the advantages in comparison with other techniques are discussed. The method has shown particularly well suited for the study of heterogenous mixtures, mainly because it is possible to obtain sedimentation coefficients and relative concentrations independent from the total concentration and from the Johnston–Ogston effect. An application to the analysis of ribosomal extracts is reported, and some results are shown. Author

N68-21193# School of Aerospace Medicine, Brooks AFB., Tex.
PECULIARITIES OF AUDITORY ANALYSER FUNCTION DURING PROLONGED EXPOSURE TO A CHANGED GAS ENVIRONMENT [OSOBENNOSTI FUNKTSII SLUKHOVOGO ANALIZATORA PRI ULITEL'NOM PREBYVANII CHELOVAKA V USLOVIYAKH IZMENENNOY GAZOVOY SREDY]

Ye. M. Yuganov, Yu. V. Krylov, and V. S. Kuznetsov 1967 7 p Transl. into ENGLISH from Russian Presented at the 18th Congr. of Intern. Astronautical Federation, Belgrade, 25–30 Sep. 1967
(SAM-TT-R-943-0268; AD-665792)

Studies were made of mans response to reduced barometric pressure (308 mm Hg) with normal pO2, to 2% CO2 air, and to a helium and oxygen atmosphere. Dynamic audiometry and studies of the time required for reverse auditory adaptation revealed no tendencies for deviation beyond the physiologic norm. Notably, the auditory analysor displays great tolerance to space cabin atmospheres. Author (TAB)

N68-21237*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
EXPLORING IN AEROSPACE ROCKETRY. 21: BIOMEDICAL ENGINEERING
Kirby W. Hiller Washington 1968 24 p ref Presented at Lewis Aerospace Explorers Conf., Cleveland, 1966–1967
(NASA-TM-X-52408) CFSTI: HC$3.00/MF$0.65 CSCL 06E

The four main areas in which biomedical engineering principles are applied to biology and medicine are discussed. They include diagnostics, treatment, prosthetics, and biological research. Infrared and X-ray photography, machines for blood diagnosis, automatic monitoring equipment for intensive care patients, and computerized diagnosis, are some of the major developments considered in the area of diagnosis. The heart lung machine, heart assist pump, lasers, cryogenic probe, and air-inflated Hoverbed for burned patients, are examples of medical engineering equipment which makes new treatment techniques possible. Details are given on the functions and operations of an automatic heart, and brief consideration is given to other areas of prosthetics such as artificial kidneys and limbs. An assessment is made of some major developments in biological research and the incompatibility of man and his machines. B.S.D

N68-21251# Radio Corp. of America, Moorestown, N. J.
EXPERIMENTAL STUDY OF THE EFFECTS OF SURROUND BRIGHTNESS AND SIZE ON VISUAL PERFORMANCE Final Report, Mar. 1966–Mar. 1967
Fred H. Ireland, William Kinslow, Edwin Levin, and Donald Page Wright-Patterson AFB, Ohio AMRL Sep. 1967 57 p
(Contract AF 33(615)-3773)
(AMRL-TR-67-102; Rept.-67-101; AD-666045)

A visual display must often be used in a setting where the surrounding visual field is brighter than the background area within the display. Such use violates a common human factors recommendation that the brightness of the display surround should be equal to, or slightly less than, that of the background in the display itself. The purpose of this experiment was to determine, quantitatively, the degradation in visibility due to high surround brightness and thus to provide useful data for the display system designer. Measurements were made of the target-to-background contrast required for each of 5 Ss to determine, with 50% accuracy, the orientation of a light Landolt ring target centered on a darker circular background. The target gap subtended 1.93 minutes of arc. Background angular subtense was varied from 5 degrees to 45 degrees, background brightness from 0.17 to 18.43 millilamberts and surround-to-background brightness ratio from 0:1 to 100:1. A uniform surround, independently variable in brightness with respect to the background, filled the rest of the visual field. The scene was viewed monocularly with natural pupil. The contrast limen was found to vary directly with surround-to-background brightness ratio for ratios greater than one. The variation with background size was smaller than predicted by an equation for integrating the effects of point sources of glare. An apparent tendency for a slight increase in limen as the surround-to-background ratio decreased from 1:1 to 0:1 was not statistically significant. Results are described by equations, and a procedure for their practical application is illustrated. Author (TAB)

N68-21330# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
PROBLEM OF FORMING IN A MAN OPERATOR A HABIT OF TRACKING MOVING TARGET [K VOPROSU O FORMIROVANII U CHELOVEKA-OPERATORA NAVYKA SLEZHENIYA ZA DVIZHUSHCHEYSYA TSEL'YU]
G. V. Sukhokol'skiy 23 Aug. 1967 15 p refs Transl. into ENGLISH from the publ. "Problemy Obshchey i Inzhenernoy Psikhologii" Leningrad, Izd-Vo Leningradskogo Univ., 1964 p 80–89
(FTD-HT-66-543; AD-666064)

Cybernetics stimulated the large-scale use of the method of functional analogy which makes it possible to compare technical and human activity systems and express them in terms and symbols of a common control theory. Tracking is a common feature of numerous occupations, ranging from car driving to radar operation, and it can conveniently be analyzed by the method of functional analogy. The Human tracking system is discussed as the most interesting and highly efficient human activity because of the psychological control factor involved in its operation. The human tracking system is characterized by self-adjusting and self-correcting features which, apparently, is not always the case with technical systems. Experimental investigations of a human operator tracking a moving target revealed that the human tracking system is both oscillating and optimizing and capable of self-change and self-adjustment. It is considerably more complicated than the technical tracking systems, less accurate in certain specific functions but more stable and reliable. Author (TAB)

N68-21339# HRB-Singer, Inc., State College, Pa.
PSYCHOLOGICAL FACTORS RELATED TO TOLERANCE OF CONFINEMENT Final Report
C. E. Newmiller, P. S. Francis, and R. B. Cooper Nov. 1967 129 p refs
(Contract OCD-PS-65-5)
(Rept.-75111-3F; AD-666233)

The report presents the findings of two shelter confinements. Two fifty-one-person groups were separately confined in a fallout shelter for sixty-seven hours each. Several psychological measures were employed in the study, and their applicability to it is discussed. The effect of a trained shelter manager on defections and other in-shelter behavior is also presented. Author (TAB)

N68-21345# Mine Safety Appliances Co., Pittsburgh, Pa.
ENGINEERING RESEARCH PROTOTYPE DISTRIBUTION SYSTEMS FOR THERMALIBRIUM CLOTHING
Harry W. Austin, W. C. Hess, and Michael Theodore Natick, Mass. Army Natick Labs. Oct. 1967 45 p ref
(Contract DA-19-129-AMC-118(N))
(TR-68-21-CM; C+OM-37; AD-666226)

The results of material optimization, fabrication techniques and the fabrication of prototype air distribution systems for thermalibrium clothing are summarized. The engineering research effort was accomplished in two work phases. The initial phase was directed to the testing of materials, the development of fabrication techniques and the fabrication of two prototype systems for design verification testing. The second phase of the program involved the modification of patterns, and the fabrication of 34 air distribution systems on a modified production basis. The counter-flow system of distribution ventilating and/or conditioned air for protective clothing can be manufactured under standard production methods, using commercially available materials. Author (TAB)

N68-21368# Human Engineering Labs., Aberdeen Proving Ground, Md.
CRITERIA FOR ASSESSING HEARING DAMAGE RISK FROM IMPULSE-NOISE EXPOSURE
R. Ross A. Coles, Georges R. Garinther, David C. Hodge, and Christopher G. Rice Aug. 1967 128 p refs
(TM-13-67; AD-666206)

Criteria are presented for assessing damage risk from impulse-noise exposure. The criteria are based on conclusions of independent British and American studies and on the work of other research workers in this field. Most of the studies which led to these criteria were performed with noise from small arms, but the criteria are general enough to permit assessment of most other types of impulse noise. The variables which must be considered in determining the potential hearing hazard and in making practical application of the criteria are presented, and the parameters which must be measured are defined. The measurement technique and type of transducers to be used are discussed. Author (TAB)

N68-21383*# National Aeronautics and Space Administration. Manned Spacecraft Center, Houston, Tex.

REVIEW OF NASA-MSC ELECTROENCEPHALOGRAM AND ELECTROCARDIOGRAM ELECTRODE SYSTEMS INCLUDING APPLICATION TECHNIQUES

J. L. Day Washington Apr. 1968 16 p refs

(NASA-TN-D-4398) CFSTI: HC$3.00/MF$0.65 CSCL 06B

The development and evaluation of a silver/silver chloride/gelatinate matrix electrode with a specially prepared electolytic paste are described. The system was developed to enhance readings of space flight electroencephalogram, electrocardiogram, and respiration monitoring systems. Details of the electrode, electrolytic paste, harness assembly, and integument subsystems are given followed by a step by step presentation of application procedures. These electrodes are more artifact free than conventional electrodes. If the application procedure is followed meticulously, the electrodes will remain in place and provide a high quality signal for long periods. Dermatological and microbiological tests show that the paste and electrodes are nonirritating and cause insignificant microbial proliferation during 14-day periods. R.N.A.

N68-21387# Argonne National Lab., Ill.

INVESTIGATIONS ON THE PERCEPTION OF THE GRAVITY STIMULUS [UNTERSUCHUNGEN UEBER DIE PERZEPTION DES SCHWERKRAFTREIZES]

O. J. Rutten-Pekelharing Oct. 1967 79 p refs Transl. into ENGLISH from Rec. Trav. Botan. Neerl. (Germany), v. 7, 1910 p 241-344

(ANL-TRANS-545) CFSTI: HC$3.00/MF$0.65

The perception of stimuli by plants resulting in phototropic and geotropic responses is directly affected by the duration and intensity of these stimuli. This hypothesis was experimentally investigated using Avena coleoptiles subjected to gravitational and centrifugal forces and light stimuli of varying intensities and durations. The results indicate that the perception of these stimuli is predicated on the position of the coleoptile at a given intensity for a given duration of the stimuli. The results of the investigation may be summarized as follows: the produce of the effective force and the presentation time is constant for gravity and centrifugal stimulations for the same plant under the same conditions; the perception of the gravity stimulus is not equal to that of the light stimulus; and roots from which the starch was removed can still react geotropically even though damage is evident. A bibliography of the early investigations in this area is included. NSA

N68-21392# Army Medical Research Lab., Fort Knox, Ky. Biophysics Div.

SOME EFFECTS ON RUBY LASER IRRADIATION ON RAT PERFORMANCE Interim Report

Samuel H. Revusky 16 Nov. 1967 29 p refs

(Rept.-759; AD-666179)

A total dose of 100 joules delivered during 1.8 ms at a density of 20 j/sq cm on the midline of the abdomen disrupted performance in the presence of the rewarded stimulus, but did not appear to disorganize the animals; that is, the discrimination between the rewarded stimulus and the nonrewarded stimuli remained intact. The effect disappeared on the third day after irradiation. Lower doses appeared to be ineffective, although differences in individual susceptibility to irradiation preclude a definite finding at this point. A similar dose of 200 joules to the head appeared to be the threshold for performance decrement. There was some evidence that head injury could produce a longer lasting performance decrement and could disorganize behavior in a manner not obtainable with irradiation of the abdomen. Author (TAB)

N68-21397# Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.

ADAPTATION TO PROLONGED CONSTANT ANGULAR ACCELERATION Progress Report

James H. Brown and James W. Wolfe 31 Jan. 1968 40 p refs

(AMRL-764; AD-666178)

Two independent groups of normal human subjects were exposed to a number of long-duration (up to 96 sec), relatively high-intensity (3 degrees/sec sq - 24 degrees/sec sq) constant, angular accelerations. Nystagmic decrements during stimulation were clearly evident. The decrements were initiated at about the same time after stimulus onset (30-35 sec) for all accelerations used. The decrements in the nystagmic responses were compared to related findings for both subjective and electrophysiological responses. Author (TAB)

N68-21405 National Institutes of Health, Bethesda, Md. Library Translating Unit.

CHANGES IN CIRCULATORY AND NEUROPSYCHOLOGICAL CONDITIONS BROUGHT ABOUT BY SOME PSYCHOLOGICALLY ACTIVE DRUGS UNDER ENVIRONMENTAL HYPERBARIA

G. Albano, A. Di Benedetto, P. M. Criscuoli, T. Indovina, A. Candia et al. 15 Feb. 1968 8 p refs Transl. into ENGLISH from Boll. Soc. Ital. Biol. Sper., no. 39, 1963 p 2082-2085

Interrelations among various changes in the circulatory and neurophysiological conditions of humans resulting from the administration of psychologically-active drugs administered under environmental hyperbaria were investigated. When six expert skin divers were subjected to a mixture of 8.64 atm nitrogen and 0.36 oxygen, partial improvement of mental functions were obtained with ritalin and centrophenoxine and appeared to be independent of any hemodynamic changes; there was almost no increase in cerebral flow with the latter, although dextroamphetamine which gives rise to distinct improvement of cardiocirculatory conditions does not diminish errors in an arithmetic test. Increased drug dosage does not bring about increased mental functioning. M.W.R.

N68-21419# School of Aerospace Medicine, Brooks AFB, Tex.

WATER RECOVERY FROM HUMAN LIQUID WASTES BY DISTILLATION AND CHEMICAL OXIDATION

Michael J. Ryan and Edward Edgerley, Jr. Dec. 1967 31 p refs

(SAM-TR-67-110; AD-666471)

The recovery of potable water from human urine by atmospheric and vacuum distillation and by chemical oxidation was investigated, utilizing the parameters of organic carbon, biochemical oxygen demand, and chemical oxygen demand. Linear relationships existed between organic carbon, BOD, and COD for the human urine samples studied. The ratio of organic carbon to BOD equaled 1.34; that of BOD to COD equaled 0.52; and that of organic carbon to COD equaled 0.64. The vacuum distillation of urine yielded a water suitable for human consumption. The chemical oxidation of human urine by ozonation was not found to be a practical means of treatment and water recovery because of the excessive quantities of ozone required. Author (TAB)

N68-21434# Indiana Univ., Bloomington. Cardiopulmonary Lab.
ATTEMPTED ACCLIMATIZATION BY VIGOROUS EXERCISE DURING PERIODIC EXPOSURES TO SIMULATED ALTITUDE Technical Report, Sep. 1965–Apr. 1966
Raymond H. Murray, Spencer Shropshire (AMRL), and Leonard Thompson Wright-Patterson AFB, Ohio AMRL Sep. 1967 18 p refs
(Contract AF 33(616)-8378)
(AMRL-TR-67-114; AD-666044)

Acclimatization to altitude by means of periodic short-term chamber exposures could have military and athletic application by preparing unacclimatized subjects for endurance performance at altitude. Three unconditioned men were trained daily by endurance running for 3 weeks at ground level. Following control measurements, they exercised strenuously on a treadmill 2 hours daily for 17 days in a chamber at a simulated altitude of 2300 meters. Responses were evaluated by: symptoms; maximum work performance (as measured by the duration of exercise-to-tolerance); maximal heart rate; duration of breath-holding; production of lactate and excess lactate; maximum expiratory minute volume and oxygen consumption. During the initial periods of exercise at altitude, maximum work performance fell significantly from control levels (average 23%), with striking symptoms of exhaustion; breath-holding duration fell 13%; the production of excess lactate rose significantly in two subjects. Over the remainder of the altitude exposures exercise performance and breath-holding duration increased to near control levels while fatigue was much less noticeable. Maximal heart rate varied greatly. There was no significant change in maximal oxygen consumption during exercise at altitude, but expiratory minute volume rose slightly. During the period of altitude exposures, symptoms common with chronic exposures (malaise, Cheyne Stokes respiration, rheumatic complaints) were often noted both in the chamber and at work and at home. Author (TAB)

N68-21469# Michigan State Univ., East Lansing. Div. of Engineering Research.
ON RELATING THE BEHAVIOR OF A SYSTEM TO THE BEHAVIOR OF ITS CONSTITUENTS. CELLULAR DIFFERENTIATION AND THE APPLICATION OF LIAPUNOV'S DIRECT METHOD TO STATISTICAL MECHANICS Interim Scientific Report
Philip S. Ulinski and William L. Kilmer 31 Jan. 1968 68 p refs
(Contract AF 19(628)-5076; Grants AF-AFOSR-1023-66; AF AFOSR-1023-67)
(AFOSR-68-0217; ISR-1; AD-666469)

The problem of relating microscopic processes to macroscopic processes is discussed by studying the way in which the morphological states of animal and plant cells are related to their metabolic pathways and by introducing an entropy concept based on the stability of the molecular equations of motion. The use of Liapunovs direct method instead of probability methods in many-body problems is stressed. Author (TAB)

N68-21485# Army Medical Research Lab., Fort Knox, Ky. Experimental Psychology Div.
INTENSITY OF THE RT READY-SIGNAL AS A DETERMINANT OF ADAPTATION LEVEL Interim Report
David L. Kohfeld 29 Jan. 1968 21 p refs
(AMRL-763; AD-666180)

Forty male Ss were given a simple reaction time (RT) test with four ready-signal conditions, 10 Ss in each condition. A fifth group of 12 Ss received all four ready-signal conditions in a counterbalanced order on consecutive days. The results indicated that a 90-db ready-signal produced the slowest mean RT, 30-db the fastest, 60-db intermediate, while a random combination of ready-signals with a mean of 60-db also produced intermediate RTs. It was concluded that the ready-signal served as an adaptation stimulus against which the response-signals were perceived. Author (TAB)

N68-21537*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
FM HANDLING AND ANALOG-TO-DIGITAL CONVERSION OF BIOMEDICAL DATA FROM A 1,000-FLIGHT STUDY
Richard Carpenter and James Roman Washington Apr. 1968 12 p refs
(NASA-TN-D-4488) CFSTI: HC $3.00/MF $0.65 CSCL 06B

To collect, process, and analyze FM-recorded biomedical data from 1,000 flights in high performance aircraft and test vehicles, it was necessary to devise a handling facility that would prepare these data in a standard format for high speed computer processing. The handling system designed maintains the very high signal to noise ratio inherent in the original data acquisition equipment, provides pushbutton control for converting the medical information into a standard format for digital processing at either four or eight times faster than the original record speed, and provides an effective number of quality control checkpoints. The system is described in detail, and system design considerations are discussed in relation to preventing data degradation in both FM handling and digital conversion. Approximately 1,400 hours of flight data have been processed by this system in less than 600 hours without loss of data integrity. This system is suitable for preparing biomedical data in standard format for digital processing, since the system design can easily be changed to accommodate nonstandard input formats. Author

N68-21538*# National Aeronautics and Space Administration. Flight Research Center, Edwards, Calif.
RECORDING AND SIGNAL-CONDITIONING TECHNIQUES AND EQUIPMENT USED IN A 1,000-FLIGHT BIOMEDICAL STUDY
Richard Carpenter and James Roman Washington Apr. 1968 17 p refs
(NASA-TN-D-4487) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The NASA Flight Research Center recently concluded a biomedical monitoring program involving 1,000 flights in high performance aircraft by students of the USAF Aerospace Research Pilot School and by NASA aerospace research pilots. To permit accurate and reliable data acquisition of electrocardiogram (ECG), respiration rate, and normal acceleration, it was necessary to design and develop a means of reliably recording and transcribing flight medical data in a format compatible with computer reduction. Signal conditioners and interconnecting harnesses were designed and fabricated, and guidelines were established for the construction of a five channel analog tape recorder to record these data while the recorder is being carried on the pilot with minimum interference or discomfort. The equipment operated reliably and enabled satisfactory data acquisition of biomedical information both in extended biomedical instrumentation studies and in remote site medical monitoring. Author

N68-21541# North American Aviation, Inc., Columbus, Ohio.
OPERATIONAL STUDY OF PILOTS' VISUAL REQUIREMENTS Final Report
G. L. Burnett and L. M. Cunningham Johnsville, Pa. Naval Air Develop. Center 27 Feb. 1968 119 p refs Prepared in collaboration with the Naval Air Develop. Center
(Contract N00156-67-C-1100)
(NADC-AC-6803; AD-666116)

A preliminary study in which visual tasks, lighting utility, and ambient external light levels were examined on a time-task basis in an instrumented F4B aircraft. Methods included photometric and electrical recordings of the internal and external lighting environment of the aircraft. Also, pilot interviews, questionnaires, and direct observations of pilots in the F4B and other aircraft were employed. The results indicate that the methods employed are practical and that the visual tasks performed and ambient external lighting conditions are important determinants of lighting utility inside the cockpit. Author (TAB)

N68-21591# Naval Submarine Medical Center, Groton, Conn.
IMPROVING THE INTELLIGIBILITY OF HELIUM-SPEECH PRODUCED IN 13.13 TIMES NORMAL ATMOSPHERIC PRESSURES
R. L. Sergeant 8 Jan. 1968 9 p refs
(Rept.-68-1; AD-666297)

The study reports the results of efforts to improve the intelligibility of helium-speech when spoken at a simulated depth of 400 feet. These efforts included the taping of helium-speech and playing it back to listeners at half speed, also passing it through an equipment system (Varivox) which shifted frequencies downward by a factor of two while preserving real time. Higher intelligibility was obtained by employing a high-fidelity microphone and recording system. The intelligibility of this recording was greatly increased when the playback was slowed to one half speed. And a significant further increase in intelligibility was found when frequencies were shifted downward by the techniques inherent in the special equipment described. Author (TAB)

N68-21615# Texas Christian Univ., Fort Worth.
VERBAL ESTIMATION OF DISTANCE IN A SIMULATED SPACE ENVIRONMENT
Malcolm D. Arnoult, Bill R. Brown, Robert J. Vincent, and Sandra Tees Dec. 1967 32 p refs

Preliminary work has indicated that when Ss are given no information other than the real size of the target, verbal estimates of distance over the 200-5000 ft. range tend to have a median error of about 55%, with errors on individual trials running as high as 1000%. Two experiments investigated possible ways of improving the accuracy of verbal judgments. Effects due to kind of stimulus sequence (random or sequential), distance range, and the presence of verbal anchors were examined. In the first experiment the limits of the distance range being used were shown and identified to the Ss before each set of 10 judgments of randomly chosen distances. The use of these "anchors" reduced the median error to about 15%. A second experiment investigated the effect of sequential presentation of distances. The effect of anchors was about the same, but there were also some adaptation effects stemming from the sequential order of stimulation. Author

N68-21628# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
RADIATION INJURY OF MYELOPOIESIS IN MONKEYS [LUCHEVOYE PORAZHENIYE KOSTNOMOZGOVOGO KROVOTVORENIYA U OBEZ'YAN]
M. I. Novikova 8 Sep. 1967 11 p refs Transl. into ENGLISH from Med. Radiol. (USSR), v. 10, no. 6, 1965 p 42-46
(FTD-MT-24-154-67; AD-666139)

540-630 R of gamma radiation completely suppressed hemopoiesis in monkeys. During the first 8 days after exposure, leukocyte count in the peripheral blood dropped sharply, but the red blood cells showed no significant abnormalities. From the 9th to the 19th day, suppression of hemopoiesis became more pronounced. The leukocyte count dropped further and the concentration of hemoglobin decreased in the red blood cells. 30% of the animals died during this period but the first signs of recovery began to appear—occasional immature cell forms in the red marrow, and reticulocytes in the peripheral blood. During the third or restorative period (20th to 60th day) the animals appeared completely healthy, and the peripheral blood indices were more or less normal. It is suggested that these experiments may help to uncover the mechanisms underlying the development of leukemia and aplastic anemia caused by ionizing radiation. Author (TAB)

N68-21649# George Washington Univ., Alexandria, Va. Human Resources Research Office.
A CLASSROOM METHOD OF TRAINING AIRCRAFT RECOGNITION
Paul G. Whitmore, John A. Cox, and Don J. Friel Jan. 1968 44 p refs
(Contract DA-44-188-ARO-2)
(TR-68-1; AD-666093)

A prototype classroom training program was developed to train observers to recognize 16 jet fighter/attack aircraft to a criterion performance level of 95% correct recognition at five-second exposures. Previously developed experimental 35mm color slides were used for training. The training method placed emphasis on recognition feature learning, discrimination learning by means of similarity groupings of aircraft and simultaneous paired comparisons, cumulative practice and review, periodic testing, and remedial training. The 95% level was reached during the 16th 50-minute session, an average of one aircraft per session. On a transfer test using degraded images, the class averaged 61%--three times higher than a traditionally trained class in a previous pilot study. Most of this gain, however, may be due to increased training time. There was a substantial correlation between the transfer test and achievement, indicating that the recognition skill acquired during training would transfer to some other image condition. There are suggestions for improvement of the prototype program. Author (TAB)

N68-21659*# Exotech, Inc., Washington, D. C.
STUDY OF ANALYTICAL TECHNIQUES IN PLANETARY QUARANTINE Final Report
7 Dec. 1967 106 p refs
(Contract NASw-1550)
(NASA-CR-94135) CFSTI: HC $3.00/MF $0.65 CSCL 06T

This report summarizes analyses related to two major areas of the NASA Planetary Quarantine Program, viz, 1. Methods for the formulation of planetary quarantine standards and for the definition of measures of compliance. Emphasis in this area is placed upon the simplification and clarification of several concepts within the quarantine requirements framework, as well as a sensitivity study of program implementation. 2. Analytical techniques related to the heat sterilization of planetary spacecraft. Emphasis in this area is placed upon survival model development, evaluation of experimental data, model parameter estimation, the sterilizing effects of heat-up and cool-down and the feasibility of a physical diffusion model of microbial resistance to heat sterilization. Author

N68-21676# Bolt, Beranek, and Newman, Inc., Cambridge, Mass.
ADAPTIVE CHARACTERISTICS OF THE HUMAN CONTROLLER OF THE TIME-VARYING SYSTEMS Final Technical Report, Dec. 1962–Dec. 1965
Jerome I. Elkind and Duncan C. Miller Wright-Patterson AFB, Ohio. AF Flight Dyn. Lab. Dec. 1967 191 p refs
(Contract AF 33(657)-10124)
(BBN-1360; AFFDL-TR-66-60; AD-665455)

The studies are directed toward the development of models for one aspect of human controller adaptation--adaptation by trained controllers to sudden changes in controlled-element dynamics of single-axis compensatory control systems. The multi-phase model proposed consists of detection, identification, modification, and optimization phases. Detailed models for all four phases of the adaptive process are presented and substantiated by experimental results. Author (TAB)

N68-21730# California Univ., Davis. Radiobiology Lab.
FISCAL YEAR 1967 Annual Report
Jun. 1967 88 p
(Contract AT(04-3)-472)
(UCD-472-114) CFSTI: HC $3.00/MF $0.65

Clinical observations on the effects of single and fractionated whole body X-irradiation and radionuclide toxicity in female beagles are reported. Preliminary reports are included on the survival of control and irradiated beagles, the age and causes of death in

control and irradiated subjects, and the ultrastructure of normal and neoplastic mammary tissues of the beagle. Hepatic lesions in control and irradiated beagles are described, and a discussion is presented on the use of beagles as experimental dogs. The bone seeking radionuclides strontium 90 and radium 226 are examined in the toxicity studies. E.J.S.

N68-21738# Human Factors Research, Inc., Santa Barbara, Calif.
VISUAL DETECTION OF POSITIVE VS NEGATIVE PIPS ON A RADAR PPI
C. H. Baker and William K. Earl Feb. 1968 13 p refs
(Contract Nonr-4120(00))
(TM-750-1; AD-666577)

Radar pip visibility thresholds were determined for conventional positive pips, and for negative pips, which were generated by applying a signal to the cathode of a CRT. It was concluded that at optimum phosphor brightness, pip visibility thresholds for positive and for negative pips, on both P7 and P19 phosphors, differ by less than one decibel. Author (TAB)

N68-21752# School of Aerospace Medicine, Brooks AFB, Tex.
FLAME PROTECTION AFFORDED MICE BY A NONCOMBUSTIBLE GARMENT IN 100% OXYGEN ATMOSPHERES
John J. Hargreaves and Frode Ulvedal Sep. 1967 23 p refs
(SAM-TR-67-91; AD-665833)

Thirty-nine mice, with hair clipped or unclipped, were clothed in a noncombustible garment, Beta cloth, and subjected to flame ignition in 100% oxygen atmospheres from 744 to 190 mm. Hg total pressure. The experimental results showed that the noncombustible garment afforded protection from combustion and flame propagation only if the animals hair had been previously clipped. Further studies should be conducted in an effort to assure mans protection. Author (TAB)

N68-21795# School of Aerospace Medicine, Brooks AFB, Tex.
FOURTEENTH ANNUAL CONFERENCE OF AIR FORCE BEHAVIORAL SCIENTISTS
Charles L. Jennings, ed. and Carlos J. G. Perry, ed. Dec. 1967 403 p refs Proc. held Lackland AFB, Tex., 18–20 Jan. 1967
(AD-665846)

CONTENTS:

N68-21796# School of Aerospace Medicine, Brooks AFB, Tex.
THE ROLE OF THE FLIGHT SURGEON AND PSYCHIATRIST IN EVALUATION AND TREATMENT OF PSYCHIATRIC CASUALTIES FROM THE USAF SURVIVAL SCHOOL
James S. Robbins *In its* 14th Ann. Conf. of Air Force Behavioral Scientist Dec. 1967 p 28–42 (See N68-21795 11-05)

Background, objectives, and methods employed at the Air Forces survival school are surveyed, and the roles of the flight surgeon and the psychiatrist in the evaluation and treatment of psychiatric casualties are considered. Attention is given to psychiatric syndromes encountered, and four case histories are included to show the scope of difficulties. M.W.R.

N68-21797# School of Aerospace Medicine, Brooks AFB, Tex.
SSORT-TERM GROUP TREATMENT OF LATE-ADOLESCENT AIRMEN Followup Report
Allen W. Davis *In its* 14 Ann. Conf. of Air Force Behavioral Scientist Dec. 1967 p 43-56 refs (See N68-21795 11-05)

Short-term group therapy is discussed that enables late adolescent airmen to adjust to the demands of military life and complete their enlistments. The literature is reviewed and some clinical experiences are presented that indicate the success of group therapy methods. The advantages of beginning several groups with the intention of obtaining one long-term and well-motivated group are implied, although it is emphasized that the short-term group experiences can be used very effectively. M.W.R.

N68-21798# School of Aerospace Medicine, Brooks AFB, Tex.
AEROSPACE PSYCHIATRY—RESEARCH CONSIDERATIONS
Terence F. Mc Guire *In its* 14th Ann. Conf. of Air Force Behavioral Scientist Dec. 1967 p 225-240 refs (See N68-21795 11-05)

Psychiatric selection methods for hazardous duties and problems of stress psychophysiology are discussed in terms of aerospace research activities, and it is speculated that total knowledge today may not be adequate for future needs. Mention is made of Air Force pilot population, from which the selectees for civilian and military space endeavors have usually been chosen; and consideration is given to aerospace crew size, crew environment, and mission duration. Use of psychoanalytic procedures is discussed, as are group therapy methods; and patterned and other response patterns are mentioned. M.W.R.

N68-21799# School of Aerospace Medicine, Brook AFB, Tex.
PERFORMANCE OF RHESUS MONKEYS DURING CONTINUOUS LOW-LEVEL GAMMA RADIATION
Robert G. Braun, Donald N. Farrer, William Zappini, and Guy H. Crook, II *In its* 14th Ann. Conf. of Air Force Behavioral Scientist Dec. 1967 p 304-313 refs (See N68-21795 11-05)

Nonlethal effects of sustained low-level radiation on primate behavior is considered in terms of the performance of six mature rhesus monkeys weighing between 4.8 and 5.3 kg. The four tasks studied were (1) a Sidman avoidance schedule on a right-hand lever using a 5 sec stimulus-response (S-R) interval, (2) discrete avoidance to 1000 cps auditory cue with 3 sec S-R interval, (3) discrete avoidance to visual cue with 3 sec S-R interval, and (4) 50:1 fixed ratio for a food reward on a left-hand lever. Temporal relationship of these tasks is shown, and mean blood sampling results are given for various times before and after exposures. The food-rewarded task appeared to be a sensitive measure of early radiation sickness from which recovery is relatively assured. M.W.R.

N68-21826# General Electric Co., Philadelphia, Pa. Re-Entry Systems Dept.
30 DAY PRIMATE EXPERIMENT BIOSATELLITE SYSTEM DEVELOPMENT, PHASE 1 Final Report, 1 Dec. 1966–15 May 1967
J. R. Harris Sep. 1967 212 p refs
(Doc.-67SD7075)

Reported are results of electrical system development tests on the 30 day biosatellite Vehicle 103 which were performed to establish electrical interface compatibility between the adapter, reentry vehicle, and the associated aerospace ground equipment (AGE). Test objectives were: (1) to verify subsystem/system electrical interface compatability; (2) to verify and evaluate the electrical performance characteristics of the system during specified controlled changes of primary power voltages within system limits; (3) to verify that system performance is within specification; and (4) evaluate the capability of the electrical AGE to control and monitor electrical system performance. Tests performed established the electrical performance of the vehicle and its basic design. The vehicle was satisfactorily exercised at three different primary power input voltages (AGE supply) to conform with the specified lower, nominal, and upper values. Most of the subsystems/systems operated electrically within their design specification. The work performed enabled an extensive evaluation of the vehicle electrical systems and the data and information derived was used in planning future test phases and also to correct design discrepancies prior to prime vehicle manufacture. S.C.W.

N68-21859*# California Univ., San Francisco. Medical Center.
RELATIVE ROLES OF GRAVITATIONAL AND INERTIAL WORK IN THE ENERGY COST OF HUMAN LOCOMOTION
H. J. Ralston and L. Lukin Washington NASA Apr. 1968 18 p refs
(Grant NsG-722)
(NASA-CR-1042) CFSTI: HC $3.00/MF $0.65 CSCL 06S

The metabolic cost of walking was measured during walking on the treadmill at various slopes—positive, level and negative—and before and after loading of the principal body segments. An equation derived from these studies relates metabolic demand to speed of walking under 1/6 g conditions, and is shown to be in acceptable agreement with the data obtained by other investigators for moderate speeds of walking under simulated 1/6 g conditions. The effects of load upon the metabolic cost of walking are shown to be critically dependent upon the segment of the body loaded. Loading of the extremities causes a much greater increase in the metabolic cost of walking than loading of the trunk, due to the greater magnitude of inertial (kinetic energy) work compared with gravitational work. The probable metabolic effects of restraint of free body motion, combined with difficult terrain, are briefly discussed. Author

N68-21876 Indiana Univ., Bloomington.
THE DETECTION RECOGNITION PROBLEM AND ITS THEORETICAL IMPLICATIONS
William A. Lindner (Ph.D. Thesis) 1966 104 p
Available from Univ. Microfilms: HC $5.20/MF $3.00 Order No. 67-3692

This study was concerned with the effect of detection criterion on the ability of human listeners to detect and to recognize sinusoidal signals presented at low intensities in white Gaussian noise. On each trial one of three stimulus events occurred: (1) presentation of a sample of white noise; (2) presentation of a 500 cps signal added to a sample of white noise; or (3) presentation of an 1100 cps signal added to the noise. The probability of noise-alone trial was .30. The two signals each had probability .35. In the detection-recognition condition, each listener made two responses on every trial. He reported whether a signal occurred (detection response) and which of the two alternative signals it was (recognition response). The recognition response was required even when the listener made a negative detection response. The ability of the listeners to detect the signal when they were not required to make the recognition response was measured in the detection condition. Dissert. Abstr.

N68-21877 Connecticut Univ., Storrs.
CODES AND HUMAN CHANNEL CAPACITY
Jerry Coleman Lamb (Ph.D. Thesis) 1966 84 p
Available from Univ. Microfilms: HC $4.40/MF $3.00 Order No. 67-3897

To test the effects of different codes, binary digits, grouped by fours giving 16 different stimulus combinations, were used. The stimuli, either nonredundant or 50% redundant, were printed on standard computer paper with 20 stimuli to each line and 8 lines to a page. Three different types of codes were used. The first was based on the "chunking" effect for short term memory, i.e., a reduction in the number of units and a consequent increase in the information per unit. Each stimulus was coded as one letter of the

set of letters from A-P inclusive. The second code type was constructed to be near optimal for information transmission; all responses were composed of different sequences of the letters A and B so that S's response set size was the same as the input alphabet size. The second code was optimal for information transmission but was not chunked. The third code combined the features of the first two codes by using letters of the alphabet from A-E and combining these five letters to produce 16 different responses. Dissert. Abstr.

N68-21902*# MSA Research Corp., Evans City, Pa.
DEVELOPMENT OF A REGENERABLE CARBON DIOXIDE REMOVAL SYSTEM Final Report, Jun. 1965–Jan. 1968
F. Tepper, F. Vancheri, W. Samuel, and R. Udavcak 15 Jan. 1968 117 p refs
(Contract NAS1-5277)
(NASA-CR-66571) CFSTI: HC $3.00/MF $0.65 CSCL 06K

The investigation of materials other than Molecular Sieve to remove CO_2 in low concentrations for application to future spacecraft life support system needs is reported. A literature survey was conducted and supplemented with small scale tests to screen potential sorber materials. Ion exchange resins, principally weak base types, were selected for further testing. Of the resins tested, IR-45 was selected to develop the necessary system design information. A laboratory system design was selected using a single bed with IR-45 sorber and steam regeneration for one third of a 1-hour cycle. A flight system is projected of about 110 pounds and 470 watts of electrical power or 270 watts electrical power and 300 watts waste heat using the same sorber and system functional design. Author

N68-21927*# Esso Research and Engineering Co., Linden, N. J. Government Research Div.
INVESTIGATION OF HEATLESS ADSORPTION TECHNOLOGY FOR CARBON DIOXIDE CONTROL FOR MANNED SPACECRAFT
Alvin Skopp and James V. Miceli 1968 103 p refs
(Contract NAS1-6918)
(NASA-CR-66582) CFSTI: HC $3.00/MF $0.65 CSCL 06K

The investigation of heatless adsorption to carbon dioxide control in manned spacecraft is reported. Heatless adsorption is a low power, rapid cycling process that can remove selected components from gaseous streams. The process uses a purge gas at reduced pressure to reactivate the adsorbent. The purge can be either a portion of the product from the adsorbing bed or a portion of the depressurization gas. The heatless adsorption process was evaluated in a two phase program for predrying and for carbon dioxide removal. System design parameters were evaluated using statistically designed experiments. The investigation indicated that air can be dried to a level of 2 to 30 parts per million moisture. Theoretical power requirement for a 3-man system are about 40 to 80 watts depending on the moisture level desired. The use of a purge gas to assist vacuum desorption of carbon dioxide from molecular sieves was not conclusively demonstrated to improve the net efficiency of the process. Though the capacity is improved, the material loss may be increased due to the increase in cycle rate. Author

N68-21952# Brookhaven National Lab., Upton, N. Y.
FUNDAMENTAL RADIOBIOLOGY FOR THE HIGH-ENERGY ACCELERATOR HEALTH PHYSICIST
Victor P. Bond, J. S. Robertson, Tor Brustad, Sheldon Wolff, G. W. Barendsen et al *In* AEC On the Biol. Interpretation of Dose from Accelerator-Produced Radiation 16 Mar. 1967 p 1–14 refs (See N68-21951 12-06)

Evaluation and interpretation of the radiation environment around higher energy accelerators was studied by the following experiments: (1) *Cellular Radiobiology in the Mammal*-- radiobiological principles for predicting radiation effects in cells; (2) *Basic Physical Mechanisms in Radiobiology*—physicochemical mechanisms in ionizing radiation interactions with absorbing material; (3) *Effects of Accelerated Heavy Ions on Enzymes in the Dry State and in Aqueous Solutions*—inactivation of enzymes by radiation; (4) *Chromosome Damage*—radiation induced gene mutations; (5) *Fundamental Aspects of the Dependence of Biological Radiation Damage in Human Cells on the Linear Energy Transfer of Different Radiations*—quantitative effectiveness differences between various cell irradiations; (6) *Fractional Linear Energy Transfer*--local density of energy deposition along the path of an ionizing particle; and (7) *Tissue, Organ, and Organism Effects*—radiation effects on cell-renewal system after total body exposure to X-rays. G.G.

N68-21953# Oak Ridge National Lab. Biology Div.
SOMATIC AND GENETIC EFFECTS IN ANIMALS AND HUMANS
W. L. Russell, Howard Parker, Clarence Lushbaugh, J. F. Fowler, Leonard A. Sagan et al *In* AEC On the Biol. Interpretation of Dose from Accelerator-Produced Radiation 16 Mar. 1967 p 81–87 refs (See N68-21951 12-06)

Reported studies on radiation effects in animals and humans are: (1) *Recent Studies on the Genetic Effects of Radiation in Mice*--radiation factors that affect mutation frequency; (2) *Data from Various Occupational Groups*--summary of radiation accident history at Lawrence Radiation Laboratory; (3) *Some Biological End Points of Dosimetric Value Derived from Clinical Data*—clinical biological responses for radiation dosage appraisal; (4) *Effects of Total- and Partial-Body Therapeutic Irradiation in Man*—results from total- and partial-body exposure of human beings to radiation and implications for workers in accelerators; (5) *Data from Animal Experiments*– somatic radiation damage in the skin of pigs, mice, and rats after irradiation with cyclotron neutrons; (6) *Recent Studies Among Persons Exposed to Radiation from Military or Industrial Sources; A Review;* (7) *Dosimetry and RBE at the Ends of Proton Trajectories*—trajectory end effects of broad proton beams near accelerators and in space flight; (8) *Relative Biological Effectiveness of Rays, X-Rays, Protons, and Neutrons for Spermatogonial Killing*—biological effectiveness of different types of radiation on mouse spermatogonia; and (9) *Intestinal and Gonadal Injury After Exposure to Fission Neutrons*—relative radiosensitivity of gastrointestinal tract and reproductive organs as specific indicators for neutron irradiation. G.G.

N68-21954# Atomic Energy Commission, Washington, D. C. Div. of Technical Information.
THE CONTRIBUTION OF BIOLOGY TO STANDARDS OF RADIATION PROTECTION
Samuel M. Nabrit *In its* on the Biol. Interpretation of Dose from Accelerator-Produced Radiation 16 Mar. 1967 p 192–196 (See N68-21951 12-06)

Briefly reviewed are the biological effects of various forms of radiation used in clinical and diagnostic medicine. Aspects of disease therapy, radiation induced mutations, and the concept of cellular repair mechanisms are outlined with emphasis on radiation dose, dose rate, and biological effectiveness. G.G.

N68-21955# California Coll. of Medicine, Los Angeles.
PHYSICAL FACTORS IN RADIATION PROTECTION
Charles A. Sondhaus, Howard Maccabee, Stanley B. Curtis, R. D. Birkhoff, George R. Holeman et al *In* AEC On the Biol. Interpretation of Dose from Accelerator-Produced Radiation 16 Mar. 1967 p 197–220 refs (See N68-21951 12-06)

Physical measurements on high-energy charged particles to specify the dose distribution within tissue in both space and time. In order to characterize radiation exposure completely, the following five quantities are determined: (1) the accumulated absorbed dose; (2) the dose rate time profile; (3) the fraction or

region of the body which has been exposed; (4) the depth-dose distribution; and (5) the energy density or any other information which characterizes the nature of the local energy distribution. Experiments with gamma irradiated and proton irradiated primates seem to establish a higher proton effectiveness in white blood cell depression; however, in terms of the absorbed dose at the midline of the animal the proton exposure, due to the buildup of secondaries, had the effect of reversing the apparent effectiveness ratio. Also described are various other studies on ionization fluctuations in cells and dose equivalent and fractional cell lethality calculations. G.G.

N68-21956# California Univ., Los Angeles. Dept. of Radiology.
NEW DEVELOPMENT AND RECENT EXPERIENCE
Norman A. Baily, Cornelius A. Tobias, Chaim Richman, Jose M. Feola, and Amos Norman *In* AEC On the Biol. Interpretation of Dose from Accelerator-Produced Radiation 16 Mar. 1968 p 329–345 refs (See N68-21951 12-06)

Research activities discussed are: (1) *Recent Results in Macro and Micro Dosimetry of High-Energy Particulate Radiation*—methodology and instrumentation for evaluating spectral data, particle analysis, and flux measurements for biological or health physics purposes; (2) *Negative Pi Mesons, Radiobiology, and Cancer Therapy*—biological experiments and dosimetric techniques with pion beam irradiation; (3) *A Review of the Physical Characteristics of Pion Beams*; (4) *Pion Radiobiology*—cytological studies with negative pions; and (5) *Use of Chromosome Aberrations for Dosimetry*—radiation dose estimates from chromosome aberration frequency in lymphocytes. G.G.

N68-22006 St. Louis Univ., Mo.
EVIDENCE FOR A DUAL CUTANEOUS VASOMOTOR CONTROL
Leon Donald Prokop (Ph.D. Thesis) 1966 117 p
Available from Univ Microfilms: HC $5.80/MF $3.00 Order No. 67-2964

Dual vasomotor control of cutaneous blood vessels, with emphasis on the existence of a neural vasodilator mechanism in the control of forearm cutaenous vasculature, was studied by a pharmacological approach in which selective peripheral blockade of the adrenergic and cholinergic nervous systems was accomplished by classical sympatholytic and parasympatholytic agents. Control and experimental skin areas on the dorsal forearm surface of human subjects were selected for experimentation. All experiments were performed at normal ambient temperatures. Solutions of the adrenolytic and cholinolytic drugs were administrered into the experimental skin areas in specific concentrations by iontophoresis. Physiological stimulation of the autonomic nervous system demonstrating cutaneous vasomotor responses was accomplished by cold stimulation of the contralateral hand and forearm.
Dissert. Abstr.

N68-22026*# Research Triangle Inst., Durham, N. C. Engineering and Environmental Sciences Div.
BIOMEDICAL APPLICATIONS TEAM Quarterly Progress Report, 15 Dec. 1967–14 Mar. 1968
14 Mar. 1968 104 p refs
(Grant NSR-34-004-045)
(NASA-CR-94295; QPR-3) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The transfer of aerospace science and technology to the biomedical field is described in terms of the activities of three multidisciplinary biomedical applications teams. The efforts expended in matching problems existing in biological and medical research programs with technology developed in NASA's research and development programs are discussed. Summary data are provided on completed transfers of technology and potential transfers which seem promising, and methods of increasing the effectiveness of the program are evaluated. Also included are six biomedical problem abstracts which are prepared for dissemination through the Technology Utilization Division to the NASA centers and other participating organization; the aim is to uncover information pertinent to a solution. These relate to thermograms of the oral cavity, small sensor measurements of surface temperature of human teeth, a bacteria sampling technique, subglottal pressure measurements, an electrode for measuring hydrogen ion concentration and carbon dioxide partial pressure in the blood, and a blood vessel constrictor. A bibliography is included. M.G.J.

N68-22045*# National Aeronautics and Space Administration, Washington, D. C.
FOOD FOR SPACE FLIGHT
1968 8 p
(NASA Facts NF-41/12-67) GPO: HC $0.20; CFSTI: MF $0.65 CSCL 06H

Presented is a brief survey on food requirements of manned space flights for Project Mercury, the Gemini Program, and the Apollo programs. Because of obvious weight and space limitations, emphasis is placed on light weight with minimal storage requirements and no refrigeration. Meal components are consumed directly from sealed containers due to conditions of weightlessness during flights. Thus, special procedures for preparing, packaging, and storing food are developed and implemented and examples of food and hardware used are shown graphically. Nutritional studies indicate that approximately 2680 calories per day are required for subjects weighing about 68 kg and a proportionally greater number for heavier subjects. G.G.

N68-22194*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY—A CUMULATIVE INDEX
Jan. 1968 887 p refs Supersedes NASA-SP-7011(45)
(NASA-SP-7011(46); NASA-SP-7011(45)) CFSTI: HC $3.00/MF $0.65 CSCL 06S

This publication is a cumulative index to the past twelve issues (SP-7011(34) through SP-7011(45)) of the National Aeronautics and Space Administration's Continuing Bibliography titled *Aerospace Medicine and Biology*. The bibliography has been compiled through the cooperative efforts of the Aerospace Medicine and Biology Bibliography Project of the Library of Congress (LC), the American Institute of Aeronautics and Astronautics (AIAA), and the National Aeronautics and Space Administration (NASA). Entries prepared by the three contributing organizations are identified as follows: (1) NASA entries by their STAR accession numbers (N67-10000 series); (2) AIAA entries by their IAA accession numbers (A67-10000 series); and (3) LC entries identified by a number in the A67-80000 series. Author

N68-22210*# Techtran Corp., Glen Burnie, Md.
ALIMENTARY BEHAVIOR AND ORGANIC ADAPTATION TO DESERT ZONES [COMPORTEMENT ALIMENTAIRE ET ADAPTATION ORGANIQUE EN ZONE DESERTIQUE]
Rene Henane Washington NASA Apr. 1968 21 p refs Transl. into ENGLISH from Rev. Corps Sante Armees (Paris), v. 4, 1963 p 33–54
(Contract NASw-1695)
(NASA-TT-F-11612) CFSTI: HC $3.00/MF $0.65 CSCL 06P

A brief description of the climate of the Sahara is followed by a detailed description of the diet of the nomadic Meharists. Religion and custom as well as practical expediency are discussed as reasons for the selection of such imbalanced eating habits. A detailed analysis of the nutritional value and substantial deficiencies offered by the diet are shown to be basic to this native group's adaptation ability to the torrid desert climate. Other tests on both man and animals are discussed and compared in terms of validity and accuracy. Author

N68-22212*# Techtran Corp., Glen Burnie, Md.
PROTECTION OF NAVAL ENGINEER PERSONNEL AGAINST HEAT [PROTECTION CONTRE LA CHALEUR DU PERSONNEL MECHANICIEN DANS LA MARINE NATIONALE]
P. Faltot Broussolle and A. Bernardini Washington NASA Apr. 1968 15 p refs Transl. into ENGLISH from Rev. Corps Sante Armees (Paris), v. 6, 1965 p 37–49
(Contract NASw-1695)
(NASA-TT-F-11613) CFSTI: HC $3.00/MF $0.65 CSCL 06Q

Four types of cool-air ventilation suits were tested in terms of applicability to surface vessels at the zero radiation level and submarines in regular duty in boiler and engine rooms. They were tested for both physiological performance and for practical use. Although inconsistent test parameters preclude final evaluation, specific criticisms are offered on all suits, and advantages and drawbacks are weighed. Precise data are given on the performances and inherent characteristics of the various models: autonomy of movement, comfort to wearer, sound muffling due to back-pack power source, etc. Author

N68-22252*# Techtran Corp., Glen Burnie, Md.
ON THE EFFECT OF EXTERNAL CONDITIONS ON THE DEVELOPMENT OF FROG EGGS
O. Hertwig Washington NASA May 1968 7 p Transl. into ENGLISH from the book "Uber Den Einfluss Ausserer Bedingungen auf die Entwickelung des Froscheies" Berlin, Sitzungbericht, vol. 1, 1894 p 311–317
(Contract NASw-1695)
(NASA-TT-F-11676) CFSTI: HC $3.00/MF $0.65 CSCL 06C

The effects of temperatures and saline solutions on the eggs of *Rana fusca* are investigated. The eggs develop normally but at an accelerated rate up to 25°C. Higher temperatures retard or halt the developmental process, starting in the vegetative portion. Cooling produces similar results. Saline solutions (6–10 g $NaCl/H_2O$) also attacked the vegatative portion of the eggs first. NaCl solutions produced brain damage in frogs (hemicephalia). Author

N68-22288 Joint Publications Research Center, Washington, D. C.
BASAL METABOLISM IN ANIMALS IN CONNECTION WITH THE NEGENTROPY PRINCIPLE OF INFORMATION
A. I. Bykhovskiy *In its* Some Spec. Appl. of Cybernetic Tech. 6 May 1968 p 11–17 refs (See N68-22285 12-10)

A living organism and its environment are considered as an isolated system to study the relationship between animal basal metabolism and the "negentropy" principle of information flow. The animal is considered to be at physiological rest, and the dependence of basic exchange on animal mass is shown for both warm-blooded animals and fresh water fish. Certain thermal values are greater for the former group. Studies in which the largest animals of certain species of animals do not show dependence of metabolism on mass indicate these animals perish. M.W.R.

N68-22316*# Dunlap and Associates, Inc., Darien, Conn.
CONSIDERATIONS FROM ENGINEERING PSYCHOLOGY
R. C. Casperson *In* NASA, Washington Recent Advan. in Display Media 1968 p 133–142 refs (See N68-22302 12-09)

The engineering psychologist is concerned with two classes of requirements in the development and implementation of display media. The first considers the information required by the human operator to perform effectively in a system. The second defines the human factors that are important for the effective transfer of this information via the display to the human operator. Several studies are reviewed and specific visual phenomena are discussed which point out some of the limitations of the available data concerning human visual performance and the faulty conclusions that can derive from the uncritical use of certain "cookbook" data. Some general guidelines are suggested for use by media researchers and display designers to assist them in meeting their ultimate goal: the transfer of useful information to man in a form that is compatible with his sensory-perceptual capabilities. Author

N68-22326*# Beckman Instruments, Inc., Fullerton, Calif.
SAFETY INSTRUMENTATION PACKAGE Final Report
31 Oct. 1966 36 p
(Contract NAS9-3910)
(NASA-CR-92056; FR-2352-101) CFSTI: HC $3.00/MF $0.65 CSCL 06Q

Design approach and new technology required for the Safety Instrumentation Package (SIP), suit equipment to be worn by personnel working inside space simulation chambers, are described. Using mostly modified off-the-shelf equipment, each SIP is instrumented independently of all the others in the chamber. Each SIP unit measures partial pressure of oxygen and carbon dioxide and suit pressure separately; and the only common apparatus involved in these three measurements are the +12 VDC and −6 VDC power supplies. Signal conditioners for pCO_2, pO_2, temperature, and pressure approach the limitations of present state of the art; and account for less than 1/10 of the errors in total system performance. New technology discussed includes the miniature electrochemical pCO_2 sensor and membrane design, the sensor amplifier, and the DC signal conditioners developed for the SIP. M.W.R.

N68-22412*# Avco Corp., Lowell, Mass. Space Systems Div.
EXPERIMENTAL ASSEMBLY AND STERILIZATION LABORATORY: CLOTHING STUDY
E. A. Botan 15 Apr. 1967 68 p Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94343; AVSSD-0138-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The major objective of this study was to determine the role clothing plays in controlling the dissemination of biological burden (microorganisms) from a worker constructing a printed circuit board assembly. Levels of shedding, approximately 10^3 to 10^5 viable particles per minute, were obtained from individuals wearing street clothes who showered approximately 1 to 2 hours before the test. The shedding was reduced to approximately 10^2 viable particles per minute when these tests were repeated with the same individuals when showered with Phisohex and, in addition, were wearing sterile scrub suits, sterile socks and sterile caps. Shedding therefore could be a major source of biological burden on an assembly. By comparing the buildup of biological burden on an assembly and in the immediate area produced by an individual dressed in a sterile hood, smock, gloves and mask with that produced by the same individual dressed in regular street clothes, a realistic evaluation of clothing requirements could be obtained. Author

N68-22442*# Sandia Corp., Albuquerque, N. Mex. Systems Studies Div.
A SYSTEMS APPROACH TO CONTAMINATION CONTROL
C. A. Trauth, Jr. Apr. 1968 38 p refs
(NASA Order R-09-019-040)
(NASA CR-94357; SC-M-68-235) CFSTI: HC $3.00/MF $0.65 CSCL 06F

Contamination control is still a subject suffering from a lack of cohesiveness because their is no theory which applies to all specific control problems and encompasses all types of contamination control techniques. This paper represents an attempt to formulate a framework in which such a theory may be developed. In effect, this is a framework in which contamination control can be planned for on a cost-effectiveness basis. Author

N68-22443# Naval Scientific Technical Information Center, London (England).
CHARACTERISTICS OF NEUTRONS AND NEUTRON SOURCES WITH REGARD TO BIOLOGICAL APPLICATIONS
Y. van der Feer 1967 16 p Transl. into ENGLISH from Atoomenergie Haar Toepassingen (Rotterdam), Jun. 1966 p 122–129
(NSTIC-TRANS-1840) CFSTI: HC $3.00/MF $0.65

Briefly described are some general properties and functions of the following: (1) interaction of neutrons with biological materials; (2) thermal and intermediate neutrons; (3) fast and relativistic neutrons; (4) production of neutrons and practical radioactive sources; and (5) use of accelerators and nuclear reactors. K.W.

N68-22448*# Rensselaer Polytechnic Inst., Troy, N. Y.
FREQUENCY CODED THRESHOLD LOGIC UNIT FOR PATTERN RECOGNITION APPLICATION
Rob Roy and David Hinks Washington NASA May 1968 72 p refs
(Grant NGR-33-018-014)
(NASA-CR-1035) CFSTI: HC $3.00/MF $0.65 CSCL 06B

The principles on which the central nervous system functions are investigated, and their application to pattern recognition problems are discussed. The concepts are then developed in the form of a frequency coded threshold logic element which will employ the advantageous techniques of information transmission exhibited by the sensory nervous system, and improve the performance of the pattern recognition system. The design develops a discriminant function that is a linear combination of weighted frequencies and computed simply as a pulse count; the operating characteristics of the system are delineated. The concept of frequency coding is used to provide a method in which modern digital techniques may be applied to incorporate speed and reliability into the design. The hardware requirements of the proposed design are given in detail and require only moderate expenditure of equipment. B.S.D.

N68-22476# National Research Council of Canada, Ottawa (Ontario).
BIOLOGICAL EFFECTS OF RARE, DISPERSED AND OTHER METALS AND THEIR COMPOUNDS USED IN INDUSTRY
S. E. Sandratskaya 1967 15 p refs Transl into ENGLISH from Toksikol. Redkikh Metallov Medgiz (Moscow), 1963 p 117–135
(NRC-TT-1283) CFSTI: HC $3.00/MF $0.65

In view of the increasing use of tellurium in industry, a comprehensive study of the toxic effect of tellurium and its dioxides was undertaken. Details are given on the study which include: (1) a study of the relative toxicity of various industrial aerosols of tellurium and its dioxides in relation to their chemical composition and dispersity; (2) a study of the principle manifestations and the individual aspects of the mechanism of the toxic effect of tellurium, and determination of the approaches to the establishment of a limit to the amount of these substances in the air in industrial premises. The experimental studies comducted to determine these properties of tellurium are described, and the results are delineated. From the results obtained in this work, it is recommended that preventative and periodical medical examinations be carried out at all plants connected with the production or use of tellurium or its compounds. B.S.D.

N68-22517*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY. PERSONNEL PROCEDURES FOR SADL OPERATIONS: JPL PROCEDURE SADL 201.00
H. C. Schwartz and E. J. Lunney 15 Apr. 1967 12 p Prepared for JPL
(Contract NAS7-100)
(NASA-CR-94383; AVSSD-0130-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

This procedure contains standards of personnel cleaning and clothing for entry and during operations in the assembly room or the sterile transfer room of this facility. Lists of minor and major violations are also given. K.W.

N68-22518*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY: QUALITY ASSURANCE PROGRAM PLAN
L. A. Paquin 15 Aug. 1967 86 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94384; AVSSD-0129-67-CR, Rev. 1) CFSTI: HC $3.00/MF $0.65 CSCL 06T

This detailed plan was prepared to maintain a uniformly high level of quality in the Experimental Assembly Sterilization Laboratory (EASL) and the Sterilization Assembly Development Laboratory (SADL) facilities. The plan is applicable for all flight spacecraft that are assembled, inspected, and tested for acceptance in the SADL and EASL facilities. Methods and procedures to assure an effective and economical system maintaining product quality are delineated. Considered in the plan are complexity of design, microbiological burden requirements, interchangeability, manufacturing techniques, decontamination processes, and reliability requirements. K.W.

N68-22519*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY: MONITORING PLAN
J. B. Mathews 15 Aug. 1967 180 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94341; AVSSD-0317-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

This monitoring plan consists of the test requirements and test procedures to be used to demonstrate: (1) that the Laminar Flow rooms of the Sterilization Assembly Development Laboratory and the Experimental Assembly and Sterilization Laboratory meet the requirements of a Class 100 cleanroom as defined by Federal Standard No. 209a; and (2) that the lab equipment permanently installed in the facility is operating as required for acceptable facility activities. The monitoring plan is limited to the mechanical acceptance criteria. Biological monitoring requirements will be included after the facility has been operated to determine requirements. Author

N68-22520*# Avco Corp., Lowell, Mass. Space Systems Div.
A STUDY OF CHEMICAL RESIDUES LEFT ON SURFACES AFTER BIOLOGICAL ASSAY PROCEDURES, PHASE 2
W. Gillchriest 15 Aug. 1967 20 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94372; AVSSD-0318-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

An evaluation of the chemical residue left on the CMTM hardware after bioassay showed peptone deposits from the three liquid methods—swabbing, rinsing, and washing. The washing method also left the detergent, Tween 80, detected by ultraviolet radiation fluorescence when combined with phosphine 3R. The two solid methods, lift-off tape and rodacing, left residuals on the hardware which were removable with organic solvents. The rodacing method did not leave residual chloride. The peptone residue was considered the least desirable from a biological burden viewpoint. Tween 80 is considered less of a biological burden problem than peptone. Author

N68-22521* Avco Corp., Lowell, Mass. Space Systems Div.
ASSEMBLY OF CMTM FOR PURPOSES OF DETERMINING AREAS OF CONTACT DURING THE ASSEMBLY PROCESS, PHASE 2
W. A. Brewer and Paul A. Kales 15 Aug. 1967 45 p ref Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94371; AVSSD-0303-67-CR) CFSTI: $3.00 CSCL 06B

Documentation is presented on the CMTM assembly operations and a determination is made of the locations on the subsystem hardware subject to the greatest handling contamination during assembly procedures. The distributions and allocations of bioassay coupons and ETO sensitive strips throughout the CMTM surfaces are also included. Author

N68-22522*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY. A STUDY OF THE MICROBIAL BURDEN ACCUMULATED ON ASSEMBLIES BUILT IN EASL UNDER DISRUPTED VERTICAL AIRFLOW
E. M. Hajema 15 Aug. 1967 35 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94339; AVSSD-0319-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Experiments were conducted to determine the effects of disrupting laminar downflow on the microbial burden accumulated on hardware assemblies. A 30° aluminum cone, 6 ft in diameter and 3 ft high, was used to demonstrate the disruption under conditions of the normal assembly facility environment; assembler and worktable under center of the cone; and assembler under cone with worktable under edge of cone, and also with the horizontal laminar airflow directed over the worktable toward the assembler. The microbial burden of the intramural air was monitored by Reynier samples; Rodac plates recorded the surface burden on the worktable; fallout strips determined the viable particles/ft^2 of surface; and stainless steel coupons inside the cone measured the microbial burden based on the air flow pattern. Data are included on the microbial counts from the timer parts assay groups, and the statistical relationships among the intramural air microbial burden samples under each set of environmental conditions. The findings show that the microbial burden of the intramural air was significantly increased during the assemblies carried out under all the experimental conditions of disrupted vertical laminar downflow. M.G.J.

N68-22523*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY DEVELOPMENT LABORATORY. DEVELOPMENT OF PROCEDURES FOR ESTIMATING THE CMTM MICROBIAL BURDEN
30 Sep. 1967 316 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94338; AVSSD-0378-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Literature studies of spacecraft biological burdens, assay techniques, and assembly procedures were conducted as a basis for establishing terminal sterilization treatment requirements. An evaluation of the swab, Rodac, lift-off, rinsing, and washing techniques indicated that washing with a surfactant reagent was the most efficient method for determining microbiological surface burdens. The factors influencing the microbial burden on various capsule mechanical training model (CMTM) subsystem assemblies are defined, and approaches for estimating the load are detailed. The probabilities of sterility for the various CMTM subassemblies following flight acceptance (FA) and/or type approval (TA) sterilization cycles are presented. Techniques, procedures, and plans are developed for estimating the microbial load at any state of CMTM assembly and prior to terminal sterilization. Statistical verification and an analysis plan are included. Supporting data are presented on assembly procedures, and coupon disposition, location, and removal. A project management scheduled is proposed. M.G.J.

N68-22524*# Avco Corp., Lowell, Mass. Space Systems Div.
CMTM BIOLOGICAL MONITORING PLAN, PHASE 2
Paul A. Kales 10 Oct. 1967 94 p Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94370; AVSSD-0323-67-CR, Rev. 1) CFSTI: $3.00 CSCL 06B

Locations are defined for the bioassay coupons to be attached to the surfaces of the capsule mechanical training model (CMTM) subsystem assemblies for removal during assembly operations. Included are coupon removal schedules, the designation of coupons to be assayed, and modifications which can be applied to the schedule for conducting related studies. Author

N68-22529*# Texas Inst. for Rehabilitation and Research, Houston.
AN EVALUATION OF INTERMITTENTLY INFLATED EXTREMITY CUFFS IN PREVENTING THE CARDIOVASCULAR DECONDITIONING OF BEDREST AND WATER IMMERSION
Fred B. Vogt Apr. 1967 120 p refs
(Contract NAS9-5821; Grant NIH FR-00254)
(NASA-CR-92085) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Intermittently inflated extremity cuffs were tested on healthy subjects to establish their effects in preventing cardiovascular orthostatic instability and body weight changes during total water immersion and bedrest studies. Body weight, fluid intake, urine output, and leg circumference measurements as well as analyses of the hematopoietic human system after tilt table intolerance studies in water immersion experiments and after prolonged bed rest periods showed that the extremity cuffs did not afford significant protection against cardiovascular deconditioning. The use of pressure garments on the lower extremities provided a statistically significant protective effect against the manifestations of cardiovascular deconditioning. G.G.

N68-22531*# Avco Corp., Lowell, Mass. Space Systems Div.
EXPERIMENTAL ASSEMBLY AND STERILIZATION LAB: IDENTIFICATION OF MICROBIOLOGICAL ISOLATES
E. A. Botan 15 Apr. 1967 30 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94337; AVSSD-0128-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06M

Eighty-three isolates from the Experimental Assembly and Sterilization Laboratory were assayed for their morphological and biochemical characteristics. Of the total, 90.4 percent were gram-positive aerobic spore formers of the genus *Bacillus*, and 9.6 percent were gram-positive aeroboc cocci, members of the genus *Micrococcus* and *Staphylococcus*, plus a Gram variable organism, *Arthrobacter*. The presence of the latter was attributed to soil particles. *Staphylococcus* aureus variety *albus* and *epidermis* seem to stem from considerable shedding of skin particles and microorganism from uncovered face and neck areas; gowning of the workers was not completely effective in controlling skin shedding contamination. Tables of all identified microbiological characteristics and species are included. G.G.

N68-22532*# Avco Corp., Lowell, Mass. Space Systems Div.
DETERMINATION OF THE HEAT RESISTANCE OF MICROBIAL ISOLATES FROM THE EASL
H. de L. King 15 Apr. 1967 35 p ref
(Contract NAS7-100; JPL-951624)
(NASA-CR-94340; AVSSD-0148-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06M

The dry heat resistance of representative bacterial spores isolated from the Experimental Assembly and Sterilization Laboratory environment was assayed at 125°C when plated onto stainless steel strips. Biological assay date after exposure from 5 to 50 minutes in a hot air oven were reduced by weighted least-square procedure to the D value, or time required for a factor of 10 reduction in the number of organisms. Obtained D-values for *Bacillus globigi*, *Bacillus megaterium*, and *Bacillus pumilus* showed a wide range; these value variations were attributed to cellular physiological differences between the various organisms of the same subspecies. G.G.

N68-22556# Joint Publications Research Center, Washington, D. C.
CERTAIN PECULIARITIES OF THE PHYSIOLOGICAL REACTIONS OF PILOTS WHILE IMITATING A SPACE WALK
D. G. Maksimov, Ye. M. Peshkov, I. A. Skiba, and A. Ye. Uglov 30 Apr. 1968 20 p refs Transl. into ENGLISH from Izv. Akad. Nauk SSSR, Ser. Biol. (Moscow), 1967 p 682–693
(JPRS-45211) CFSTI: HC $3.00/MF $0.65

Physiological reactions of pilots undergoing training for space flights and persons without such training were analyzed upon leaving the simulated spacecraft and entering a very rarefied atmosphere. Pronounced shifts in pulse rates, respiratory rates, body weights, and temperatures were found among commanders; and, as the tests were repeated, the degree of shifts diminished sharply. In copilots, the shifts of physiological functions were more pronounced than in commanders and were associated with physical stress and nervous and emotional strain. Pilots who had undergone training for space flight reacted better than personnel who had not. Changes observed were of a temporary functional nature and generally disappeared by the end of the experiments. M.W.R.

N68-22573 Joint Publications Research Service, Washington, D. C.
USE OF HIGHER PLANTS TO REGENERATE FOOD, WATER, AND AIR IN CLOSED SYSTEMS
V. P. Dadykin 6 May 1968 15 p refs Transl. into ENGLISH from Sel'skokhozyaystvennaya Biologiya (Moscow), vol. 3, no. 1, 1968 p 137–146
(JPRS-45277)

The use of higher plants in hermetic life support systems to supply food, water, and oxygen in sufficient amounts is considered for human ecology in underwater and space travel systems. Biotechnical criteria of such systems are high productivity, quality of total mass and biochemical composition, and optimal food value with mutual biological compatibility. Several experiments clearly showed a decrease in the rate of CO_2 uptake as plants aged and an increase in the evolution of CO_2 during the dark hours. Lowered partial oxygen pressure in the closed environment activated the processes of CO_2 uptake during daytime hours but caused a substantial increase in the amount of carbon dioxide released during the night. Anoxia provided a protective effect against radiation; tubers exposed to radiation under anoxic conditions remained viable. Experiments with seeds and growing plants under reduced negative pressure of about 7 mm Hg did not affect their later development negatively. G.G.

N68-22577*# IIT Research Inst., Chicago, Ill. Technology Center.
EFFECTS OF SPACE CABIN ENVIRONMENTS ON INFECTION Final Report, 19 Jul. 1965–18 Sep. 1966
Bernard J. Mieszkjc and Richard Ehrlich Oct. 1966 39 p refs
(Contract NAS9-4978)
(NASA-CR-62065; IITRI-L6031-14) CFSTI: HC $3.00/MF $0.65 CSCL 06F

The effects of a simulated space cabin environment of 27,000-ft altitude (5 psi), 98% oxygen atmosphere, 25°C, and 50% relative humidity on the resistance of mice to infection were studied. Mortality rates were determined after challenge with *Klebsiella pneumoniae* aerosols and following exposures of various duration to space cabin environment, ambient conditions, and combinations of these two. In addition, mortality rates and effectiveness of treatment were determined after *Staphylococcus aureus* infection and following various combinations of exposure to space cabin environment and dosages of 300 to 500 rads of gamma radiation. The study included examination for changes in hemoglobin, hematocrit, lactic acid dehydrogenase isoenzyme patterns, histopathological characteristics, and differential blood cell count. K.W.

N68-22635*# Avco Corp., Lowell, Mass. Space Systems Div.
EXPERIMENTAL ASSEMBLY AND STERILIZATION LAB. MICROBIOLOGICAL ASSAY AND CERTIFICATION OF SPACECRAFT HARDWARE STERILITY: JPL PROCEDURE EASL 300.01
E. A. Botan 15 Apr. 1967 30 p refs Prepared for JPL Supersedes JPL Proc. EASL 300.00
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94379; AVSSD-0134-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Procedures are established for performing microbiological assays and for certifying spacecraft hardware sterility. Personnel, equipment, and instrumentation requirements are listed, and safety standards are defined. Also covered are the calibration of air sampling devices; sample preparation; and the preparation and sterilization of microbial fallout sampling surfaces, culture media, and laboratory equipment. Test methods are outlined for microbiological samplings of intramural air, environmental surfaces, spacecraft hardware, clothing and packaging material, and personnel; total airborne particle counting; visual assays; recording parametric measurements; and quality assurance. The characteristics of volumetric air sampling and gravimetric air sampling devices are discussed. M.G.J.

N68-22680*# Avco Corp., Lowell, Mass. Space Systems Div.
STUDY OF CHEMICAL GERMICIDES
E. A. Botan and T. H. Rider 15 Apr. 1967 19 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94380; AVSSD-0133-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

In an effort to determine spacecraft sterilization techniques, the effectiveness of several chemical germicides as decontaminating agents was assessed. These included the use of a cationic surfactant in aqueous and alcoholic solution, a phenolic compound, and a chlorinated phenol against *Escherichia coli, Staphylococcus epidermidis, Proteus vulgaris,* and *Bacillus globigii* in the vegetative and spore states. The materials were chosen to simulate surfaces in low biological-burden areas. Tabulated data on the kill effectiveness of each germicide are included. The results show that the only organism that survived in numbers greater than 10% of its initial population with all four germicides was the spore of *B. globigii.* M.G.J.

N68-22681*# Avco Corp., Lowell, Mass. Space Systems Div.
EXPERIMENTAL ASSEMBLY AND STERILIZATION LAB. PROCESS SPECIFICATION FOR DECONTAMINATION OF COMPONENT PARTS, TOOLS AND EQUIPMENT: JPL PROCEDURE EASL 200.01
E. A. Botan 15 Apr. 1967 14 p Prepared for JPL Supersedes JPL Proc. EASL 200.00
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94356; AVSSD-0132-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Detailed procedures are established on the methods to be used before and after decontamination for the handling, transfer, and storage of items used in the fabrication of flight hardware in the EASL. Six decontamination categories are defined, with dry heat and ethylene oxide decontamination techniques identified as the preferred methods. Procedures for the preparation and packaging of items are outlined, along with decontamination effectiveness test requirements and ways of handling contaminated items. Quality assurance provisions are also defined. M.G.J.

N68-22682*# Avco Corp., Lowell, Mass. Space Systems Div.
STERILIZATION ASSEMBLY AND DEVELOPMENT LABORATORY: ROUTINE CLEANING AND DECONTAMINATION OF THE SADL FACILITY

E. J. Lunney and E. A. Botan 15 Apr. 1967 16 p Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94381; AVSSD-0136-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

General requirements and procedures are established to ensure that the preliminary microbiological constraints are met for the Sterilization Assembly and Development Laboratory (SADL). The equipment required for each operation is listed, and the preparation of cleaning and germidical solutions and cleaning equipment is outlined. Tentative SADL cleaning schedules are presented, and the order in which routine cleaning and decontamination is to be carried out is detailed. Quality assurance provisions are defined. M.G.J.

N68-22700# Commissariat a l'Energie Atomique, Fontenay-aux-Roses (France).
RADIOBIOLOGICAL STUDY OF THE RADIOPROTECTIVE ACTIVITY OF A NATURAL IRANIAN PRODUCT: "SHIR-KHECHT" [ETUDE RADIOBIOLOGIQUE DE LACTIVITE RADIOPROTECTRICE D UN COMPOSE NATUREL IRANIEN: "SHIR-KHECHT"]
Nasser Rouhanizadeh (Ph.D. Thesis—Paris Univ.) 31 Jan. 1968 86 p refs In FRENCH
(CEA-R-3412) CFSTI: HC $3.00/MF $0.65

After reviewing the primary mechanisms of ionizing radiation, the effects and chemical structures of radioprotective substances, and the methods for studying chemical radioprotection, this paper presents the results obtained with *Shirt-Kecht*, an Iranian manna-base drug. Tests with this product at lethal and sublethal radiation doses were performed on rats using various means of introduction. The effects of radiation were studied using histological and biochemical methods. It was found that this product, which is non-toxic and which can be taken orally, has indeed a protective effect. K.W.

N68-22756# Israel Program for Scientific Translations, Ltd., Jerusalem.
HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPOURS, RADIOACTIVE PARTICLES
1967 42 p refs Transl. into ENGLISH from German Published for Health, Educ. and Welfare and NSF *Its* Staub-Reinhalt. der Luft, Vol. 27, No. 6, Jun. 1967
(TT-67-51408/6) CFSTI: HC $3.00/MF $0.65

Six papers are presented that deal with health aspects of air polution and controlling dusts, gas, vapor, and radioactive particles in the atmosphere. Emission conditions were investigated in oil-fired furnaces provided with vaporization burners or atomizers, combined and separate determinations were made of nitrogen monoxide and nitrogen dioxide in the atmosphere, and a simple technique is described for measuring hydrocarbon content. The design and operation of a respiratory tract model is described, turbidimetric measurements of finely dispersed technical systems are included, and methods for particle size determination are reported. A patent report describes applications made in March and April 1967; and mention is made of publications from a convention on emission control. M.W.R.

N68-22757*# Avco Corp., Lowell, Mass. Space Systems Div.
EFFECTIVENESS OF UTILIZING ASSAY COUPONS FOR BIOLOGICAL LOAD PREDICTION
E. A. Botan 15 Apr. 1967 50 p refs Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94344; AVSSD-0150-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06B

Biological assay coupons are considered of value for predicting biological load or burden placed on a printed circuit board. Resistors, capacitors, transistors, relays, modules, and diodes were mounted on each of four boards, which were built in the Experimental Assembly and Sterilization Laboratory (EASL) vertical laminar flow assembly area. Boards 1 and 2 were constructed by an assembler wearing sterile hood, smock, mask, and gloves; boards 3 and 4 by an assembler in street clothing. Boards 2 and 4 had bioassay coupons, boards 1 and 3 did not; and coupon attachment was studied by use of magnets, adhesives, cements, and mechanical devices. The coupons generally distinguish between areas of burden and areas of nonburden, but the coupon technique varies in response when comparing quantitative determinations of burden made by the coupon technique with that of individual piece part assay. Aerobic mesophilic microorganisms were counted in each case. M.W.R.

N68-22759*# Avco Corp., Lowell, Mass. Space Systems Div.
STUDY OF THE PLATEAU OF MICROBIOLOGICAL CONTAMINATION ON SURFACES
E. A. Botan 15 Apr. 1967 49 p ref Prepared for JPL
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94342; AVSSD-0149-67-CR) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Vertical laminar air flow is found to accelerate the die-off rate of heterotrophic mesophilic bacteria and vegetative cells with spores which had been exposed on strips of selected materials to both laminar and nonlaminar flow in the Experimental Assembly and Sterilization Laboratory (EASL). Effects of dessication produced by exposure in controlled humidity and temperature ovens as well as in the laminar air flow area of the EASL bioassay room were examined on Escherichia coli, Bacillus globigii and pumilis, and Staphylococcus epidermidis. Die-off of the same species exposed to vertical laminar flow appears to vary with the type of surface material used, and vegetative cells die more rapidly than spores when exposed to vertical laminar flow. M.W.R.

N68-22765*# Avco Corp., Lowell, Mass. Space Systems Div.
EXPERIMENTAL ASSEMBLY AND STERILIZATION LAB. PERSONNEL PROCEDURES FOR EASL OPERATIONS: JPL PROCEDURES EASL 201.01
H. C. Schwartz and E. J. Lunney 15 Apr. 1967 12 p Prepared for JPL Supersedes EASL 201.00
(Contracts NAS7-100; JPL-951624)
(NASA-CR-94351; AVSSD-0135-67-CR; EASL-201.01; EASL-201.00) CFSTI: HC $3.00/MF $0.65 CSCL 06T

Steps for determining and reporting violations to Experimental Assembly and Sterilization Laboratory (EASL) standard contamination prevention procedures are specified. Detailed directions are given pertaining to entrance and work operations in the EASL. These directions conform to the effort to minimize microbiological contamination. E.C.

N68-22779*# TRW Systems, Redondo Beach, Calif.
MEASUREMENTS REPORT: THERMAL PROPERTY MEASUREMENTS OF MANNED SPACECRAFT CENTER SPACESUIT MATERIALS
F. J. Turnbow Apr. 1968 17 p refs
(Contract NAS9-3670)
(NASA-CR-92087; TWR-68-3346.11ja-31) CFSTI: HC $3.00/MF $0.65 CSCL 06K

Thermal radiation properties were measured for teflon coated and uncoated beta cloth, Chromel R, and Lexan coated with LEV 31 and LEV 32 space suit materials. Total hemispherical emittance measurements of the Lexan coated space suit materials were stopped because the test material separated from the heater at higher test temperatures. A difference of several per cent between short and long wavelengh measurements in the spectral overlap region from 2.0 to 2.5 microns was confirmed for Chromel R; and the beta cloth showed a difference in measured reflectance in this region between the paraboloid and integrating sphere. Since the integrating sphere beta cloth was taped flat on the holder and the

paraboloid sample was held by a nut and puffed slightly when tightened, it was concluded that there was more absorption in the latter because the rays scatter more. M.W.R.

N68-22807# Grumman Aircraft Engineering Corp., Bethpage, N. Y. Research Dept.
A STUDY OF THE MECHANICS OF HUMAN BALANCING FOR POTENTIAL APPLICATION TO THE CONTROL OF VEHICLES. PART 2: TOWARD A MATHEMATICAL MODEL OF VERTICAL BALANCING IN EARTH GRAVITY
E. Seckel (Aeron. Res. Associates of Princeton), H. Breul, T. Keller, S. Suh, and R. Weston Jul. 1967 45 p refs
(RM-369) CFSTI: HC $3.00/MF $0.65

A mathematical model, in differential equation form, of the closed-loop control behavior of a standing human, balancing a simulated, jet supported, hovering platform, has been derived. The form of the model was postulated from theoretical stability considerations. Numerical values of its coefficients were identified by a manual matching technique in which potentiometers, representing human response parameters in an analog computer model of the complete system, were manipulated so as to minimize the rms difference between real and model control (ankle deflection) responses to random disturbances. The model represents the pilot's ankle deflection as a delayed function of vehicle displacement, vehicle velocity, pilot's body tilt, and pilot's body tilt rate. Its output compares very well with the real pilot output in both the frequency and time domains. Author

N68-22815*# National Aeronautics and Space Administration, Washington, D. C.
INFORMATION PROCESSING IN THE FUNCTIONAL VISUAL FIELD [INFORMATIEVERWORKING IN HET FUNKTIONEEL GEZICHTSVELD]
A. F. Sanders Dec. 1967 13 p refs Transl. into ENGLISH from Dutch, Rept. no. IZF 1967-68
(NASA-TT-F-11408) CFSTI: HC $3.00/MF $0.65 CSCL 06D

It has been found that performance in a number of visual tasks does not linearily decline as a function of visual angle. Instead, there are stepwise drops at two visual angles, which proved to be the boundaries of the areas where inspection by means of peripheral vision and eye movements were sufficient to obtain optimal performance. The drops were explained in terms of strategies in processing visual information, which were thought to vary from grouping signals at small visual angles to successive handling at very large angles. This theory is reevaluated in the light of more recent notions on visual coding and recoding. Especially the relation between grouping and perceptual organization is considered. It is concluded that the earlier work is restricted to the macrostructure of the functional visual field. Author

N68-22824# General Electric Co., Philadelphia, Pa.
SIMULATION TECHNOLOGY—A HUMAN ENGINEERING BIBLIOGRAPHY
R. B. Webster 7 Apr. 1967 52 p refs
(Doc.-67SD265)

A list of 493 citations in the form of unclassified articles, presentations, reports, reviews, surveys and texts was developed as a general introductory reference to the literature of simulation technology as applicable to human engineering. This article is divided into two parts—classification and bibliography. The classification section contains the 13 headings under which the citations are categorized. The series of numbers following each heading refer to the similar-numbered citations in the bibliography thus enabling a systematic utilization of the material. The bibliography section contains the citations listed alphabetically by author with each entry numbered consecutively. Author

N68-22848*# Techtran Corp., Glen Burnie, Md.
CONCERNING THE INFLUENCE OF POST-MATURITY OF OVA ON THE SEX RATIO OF FROGS AND BUTTERFLIES [UBER DEN EINFLUSS DER UBERREIFE DER EIER AUF DAS GESCHLECHTSVERHALTNIS VON FROSCHEN UND SCHMETTERLINGEN]
Richard Hertwig Washington NASA May 1968 16 p refs Transl. into ENGLISH from Rept. on Sessions of the Mathematical Phys. Class of the Bavarian Acad. of Sci. (Munich), Jan. 1921 p 269-294
(Contract NASw-1695)
(NASA-TT-F-11683) CFSTI: HC $3.00/MF $0.65 CSCL 06C

The author investigates the causes underlying the sharp sexual redistribution of frogs produced from overripe eggs. The changes result solely from alterations to the ova. The author finds that: overmaturity accelerates the differentiation of the testes; the author's earlier conclusion that changes were produced in the course of egg maturation, was incorrect. In the case of butterflies, overmaturity has no physical effect on the male sex, as it does in frogs. Overmaturity produces rather an increase in the number of females. Author

N68-22850*# Naval School of Aviation Medicine, Pensacola, Fla.
DIAGNOSTIC CRITERIA FOR GRADING THE SEVERITY OF ACUTE MOTION SICKNESS
Ashton Graybiel, Charles D. Wood, Earl F. Miller, II, and Dewey B. Cramer Washington NASA Feb. 1968 14 p refs
(NASA Order R-93)
(NASA-CR-94398; NAMI-1030) CFSTI: HC $3.00/MF $0.65 CSCL 06S

New diagnostic criteria are presented for grading the severity of acute motion sickness. They are more suited to clinical application as empirical evaluations than for precise measurement of physiological functions. The new criteria differ from the old in two important respects: (1) "moderate malaise," previously defined on an exclusion basis, has been divided into two categories and precisely defined, and (2) numerical scoring is optional. By holding fast to the definition of endpoints in the "old" criteria with proven reliability and validity, the change does not seriously affect the findings in experiments where the old criteria were used. Author

N68-22876# Commissariat a l'Energie Atomique, Chusclan (France). Centre de Production de Plutonium de Marcoule.
TRITIUM. MEANS OF DETECTION AND OF PROTECTION [LE TRITIUM. MOYENS DE DETECTION ET DE PROTECTION]
Yves Sutra-Fourcade Dec. 1967 104 p refs In FRENCH; ENGLISH summary
(CEA-R-3350) CFSTI: HC $3.00/MF $0.65

The report is an attempt to correlate present data concerning tritium, especially from the health physics points of view. Methods are reviewed for measurement of tritium in the atmosphere, in liquids, and on surfaces. The operation of various types of apparatus is analyzed, and the sensitivity limits deduced from laboratory tests are given. Also discussed are the means of protection against inhalation of tritium (ventilation, protective clothing), decontamination of equipment, and calculations of atmospheric pollution and exposure. Author

N68-22882*# National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY. A CONTINUING BIBLIOGRAPHY WITH INDEXES
Apr. 1968 144 p
(NASA-SP-7011(49)) CFSTI: HC $3.00/MF $0.65 CSCL 06S

Subject coverage concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected

during the following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Each entry consists of a standard citation accompanied by its abstract. Author

N68-22894# Oak Ridge National Lab., Tenn.
DOSE PREDICTIONS AND BIOLOGICAL CONSEQUENCES FOLLOWING BURNUP OF A Sr^{90} TiO_3 SOURCE IN SPACE
T. G. Clark Aug. 1967 21 p refs Prepared for Sandia Corp.
(SC-CR-67-2792) CFSTI: HC $3.00/MF $0.65

The radiological hazard to the general population from the possible release of ^{90}Sr isotopic fuel in space is studied. Risk estimates are based upon the induction of leukemia and bone cancer in man. Author (NSA)

N68-22993# Israel Program for Scientific Translations, Ltd., Jerusalem.
HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPOURS, RADIOACTIVE PARTICLES
1967 42 p refs Transl. into ENGLISH from German Published for Health, Educ. and Welfare and NSF *Its* Staub–Reinhalt. der Luft, vol. 27, no. 4, Apr. 1967
(TT-67-51408/4) CFSTI: HC $3.00/MF $0.65

Discussed are the following topics: (1) *The Use of Propagation Formulas to Calculate Minimum Chimney Heights with Respect to Their Environment*—probability consideration for a simplified method of adding dimensioning sections to a chimney in case of buildings or trees reaching the chimney height; (2) *The Operation of Electroprecipitators with Pulse Voltages*—increased dust separation efficiency by direct voltage components and impulse parameters; (3) *Measurements of Soot Concentration in the Combustion Gases of Some Liquid Fuels*—improved measurements with electrostatic soot precipitator and optical soot density meter; (4) *Determining the Tolerance Range of the Mean Value of Dust Concentration*—equation for tolerance range of average value for dust concentration; (5) *Use of the Goetz Aerosol Spectrometer to Measure the Size Spectra of Polydispersed Aerosols*—calibration of aerosol spectrometer; (6) *The Theory of the Coincidence Error for Digital Particle Size Analysis*—extended coincidence theory for Coulter counter; (7) *An Improved Method Using the Bahco Separator*—microscopic dust particle separation; and (8) *Investigation on the Danger of Soot, Particularly Its Carcinogenic Effect*—implantation tests of soot and airborne dusts in rats. Also included is a patent report that covers patent applications and registered designs for aerosol control. G.G.

N68-23025# Israel Program for Scientific Translations, Ltd., Jerusalem.
HYGIENE EFFECTS AND CONTROL OF DUSTS, FOGS, GASES, VAPOURS, RADIOACTIVE PARTICLES
1967 48 p refs Transl. into ENGLISH from German Published for Health, Educ. and Welfare and NSF *Its* Staub-Reinhalt. der Luft, Vol. 27, No. 5, May 1967
(TT-67-51408/5) CFSTI: HC $2.00/MF $0.65

Significance of fine mineral particles in nature and technology is discussed, didactic importance of the exhibition of pulverulent materials is considered, and dust measuring technology and the classification of tests are treated from the point of view of the dust control expert. Other articles deal with changes in the meaning of amorphous and colloid following structural analysis by electron microscopy; the morphology of finely particulate oxides and hydroxides of iron, aluminum, and manganese; the morphology of pulverulent polymers; electron microscopic study of temperature-sensitive colloids; and influence of pulverulent components in plant protection. Experiences are reported for an instrument to determine electrical dust resistance; and briefs are included for industrial experience with a clean air filter, CO-determination in exhaled air, a paper sack ripping machine, and a low pressure radial fan. Two patent applications in February and March 1967 are summarized. M.W.R.

IAA ENTRIES

A68-24739 *
CONSERVATION OF ENERGY IN AMBULATION.
Verne T. Inman (California, University, School of Medicine, Dept. of Orthopaedic Surgery and Biomechanics Laboratory, San Francisco, Calif.).
(American Academy of Physical Medicine and Rehabilitation, Annual Assembly, 28th, San Francisco, Calif., Aug. 30, 1966.)
Archives of Physical Medicine and Rehabilitation, vol. 48, Sept. 1967, p. 484-488. 12 refs.
Research supported by the Veterans Administration, the Vocational Rehabilitation Administration, and NIH; Grants No. NsG-722; No. NsG-05-025-001.

Discussion of energy expenditure and conservation in human locomotion. Ways in which the body integrates its activities and shifts mechanical energy back and forth so as to adopt the most efficient speed are explained. It is pointed out that in walking the body is constantly converting energy from potential to kinetic and then back to potential energy again. M.F.

A68-24748 *
EXPERIMENTAL EMPHYSEMA - HISTOLOGIC CHANGES AND ALTERATIONS IN PULMONARY CIRCULATION.
Gerald A. Brooksby, Boris Datnow (NASA, Ames Research Center, Moffett Field, Calif.), Robert L. Dennis (San Jose Hospital, Pathology Dept., San Jose, Calif.), and Daniel Clark (San Jose Hospital, Radiology Dept., San Jose, Calif.).
(California Medical Association, Annual Session, 96th, Los Angeles, Calif., Apr. 15-19, 1967.)
California Medicine, vol. 107, Nov. 1967, p. 391-395. 17 refs.

Description of the development of experimental bullous emphysema in laboratory animals. It is pointed out that the detailed study of the pathogenesis of bullous emphysema has been hampered by lack of a suitable animal model of this disease. Prolonged exposure of rats and dogs to elevated partial pressures of oxygen produced a chronic obstructive disease in the lungs of these animals which anatomically resembles bullous emphysema in man. The disease was characterized by extensive bullae formation, alveolar septal destruction, airway obstruction, and pronounced circulatory changes. It is suggested that this condition in laboratory animals may serve as a model for the study of pulmonary obstructive disease. M.M.

A68-24749 *
MONITORING BEHAVIOR IN PRIMATES UNDER CONCURRENT APPETITIVE AND AVERSIVE CONTROL.
J. F. Dardano (Maryland, University, College Park, Md.) and J. V. Brady (U.S. Army, Walter Reed Army Institute of Research, Bethesda, Md.).
Communications in Behavioral Biology, vol. 1, Jan. 1968, p. 91-100. Grant No. NsG-189-61.

The performance of two monkeys on a task requiring monitoring and controlling the indicator position in a 20-step counter was investigated by means of concurrent food reward and shock avoidance schedules. Responses on one lever resulted in delivery of food and illumination of the next higher pilot light in a 20-light counter. Electric shock was delivered when the counter reached the twentieth step. Responses on a second lever stepped the illuminated light down to the next lower position. Appropriate manipulations of both levers provided access to food and avoided the electric shock. Both monkeys effectively monitored the counter and prevented the light from reaching the top shock position while obtaining a full ration of food. Characteristically, uninterrupted responding on the food lever was maintained on both continuous and fixed-ratio reinforcement schedules until the light reached the upper positions of the counter. The light was then maintained near but consistently below the twentieth shock step for extended periods of time by alternate responding on the food and avoidance levers, respectively. (Author)

A68-24751 #
INFLUENCE OF AMINAZINE ON THE BLOOD FLOW IN THE CARDIAC MUSCLE [PRO VPLIV AMINAZINU NA KROVOSTRUMIN' U SERTSEVOMU M'IAZI].
A. V. Gurkova'ka (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Laboratoriia Fiziologii Krovoobigu, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 14, Jan.-Feb. 1968, p. 44-50. 29 refs. In Ukrainian.

Experimental investigation of the effect of aminazine on the blood flow in the cardiac muscle of cats. It is found that intravenous injection of aminazine is accompanied by an active vasodilating effect which manifests itself in different ways in different regions of the vessel system. In the myocardium of the left ventricle, aminazine produces an increased blood flow and a decrease in the system arterial pressure, which is an indication of vasodilation in the myocardium. Due to the decrease in arterial pressure, the vasodilation effect is sometimes difficult to detect. The decrease in circulation in the cardiac muscle which is observed in the case of an abrupt drop in arterial pressure manifests itself in the form of changes in the shape of the T waves in the electrocardiogram. V.P.

A68-24752 #
STABILIZATION OF THE BASIC BIOCHEMICAL INDICES DURING THE FUNCTIONING OF A CARDIOPULMONARY PREPARATION [STABILIZATSIIA OSNOVNIKH BIOKHIMICHNIKH POKAZNIKIV PID CHAS ROBOTI SERTSEVO-LEGENEVOGO PREPARATU].
S. A. Patskina, V. I. Mishchenko, and M. D. Lobkova (Akademiia Nauk Ukrains'koi RSR, Institut Kibernetiki, Viddil Biokibernetiki, Kiev, Ukrainian SSR).
Fiziologichnii Zhurnal, vol. 14, Jan.-Feb. 1968, p. 57-63. 18 refs. In Ukrainian.

Description of a procedure for the biochemical stabilization of a cardiopulmonary preparation, which makes it possible to maintain at a constant level such biochemical blood indices as pH, the alkaline reserve, the percentage of oxyhemoglobin, and the adrenalin concentration. Tests showed that stability of the biochemical indices ensures a prolonged deterministic functioning of the heart. This made it possible to determine the unique characteristics of the functioning of the heart under static conditions and the corresponding admissible loads. V.P.

A68-24753
ASSESSMENT OF FLYING SKILL IN RELATION TO ACCIDENT LIABILITY.
A. Cassie (Ministry of Defence /Royal Air Force/, London, England).
Flight Safety, vol. 1, Spring 1967, p. 4-6. 6 refs.

Discussion of the possibility of identifying in advance pilots who are most likely to be involved in pilot-error accidents. It is pointed out that there is a trend of opinion, particularly in the U.S. in recent years, that liability to flying accidents cannot be predicted from measures of skill or aptitude nor from the biographical data available at the time of selection and that even if a study does no more than confirm this, it will be a positive achievement. An abundance of suggestions as to what are possible accident predictors has been suggested. It is emphasized that the variables which are being examined do not by any means cover more than a part of the range of possible accident predictors, and that neither do they cover exhaustively the range of information which could be obtained at entry to training. M.M.

A68-24754
INTERPRETABILITY OF SYMBOLS IN A HEAD-UP DISPLAY.
Bengt Berstrom (Svenska Aeroplan AB, Linköping, Sweden).
Flight Safety, vol. 1, Spring 1967, p. 7-11.

Description of four experimental investigations of the interpretability of symbols in a head-up display. All four experiments employed six to eight experienced subjects and the intersubject variances indicated fair reliability. Also the face validity of the experiments seems to be acceptable. The results from the first set of two experiments may lead to the following conclusions: (1) a linear scale gives a uniform but moderate precision over the

investigated height range; (2) a pole reference gives very good precision in the vicinity of the reference height; and (3) a logarithmic scale is something of a compromise between the first two. The results from the second set of two experiments seem to show that a centrally positioned indication is superior at short exposures. M.M.

A68-24755
ASSESSMENT OF STRESS-TOLERANCE IN COMMERCIAL PILOTS.
L. R. C. Haward (Graylingwell Hospital, Chichester, Sussex, England).
Flight Safety, vol. 1, Spring 1967, p. 12-17. 38 refs.

Evaluation of the tolerance of commercial pilots to stress. Commercial pilots work under stress originating from both personal and professional sources. Stress factors are both combinative and cumulative and produce physiological changes which impair flying performance in a variety of ways, among which vertigo and unconsciousness have been indicated as causes of accidents. Stress tolerance can be measured by a special technique, which is described. The value of routine stress-tolerance evaluation in preventive aviation medicine and in supporting the reinstatement of pilots suspended on psychiatric grounds is considered. A case history which illustrates the author's technique and some of the implications are discussed. M.M.

A68-24756
PSYCHOLOGICAL MECHANISMS IN PILOT ERROR.
D. Russell Davis (Bristol, University, Dept. of Mental Health, Bristol, England).
Flight Safety, vol. 1, Spring 1967, p. 18-21. 16 refs.

Experimental investigation of psychological mechanisms involved in pilot errors. The findings revealed that, in association with anxiety, marked changes in perception and in motor responses occur. Although all the changes affecting performance may be due to mechanisms of biological value, they may well be disadvantageous and maladaptive when they occur in pilots, and many of the errors made by pilots under stress may be attributed to them. Regarding the prevention of such errors, one way is to prevent the occurrence of conditions under which the outcome of a task becomes doubtful - namely, to prevent conditions producing stress. Since in every human enterprise it is to be expected that stress will occur from time to time, pilots must be trained so that they can stand up to stress without becoming disorganized. There is now a substantial body of evidence to show that the method of training affects the degree to which stresses can be tolerated. When a crisis does arise, errors are made because of the instability of perception and the disintegration of the sensory field. It is pointed out that these processes can be cut short by giving the pilot more information or by providing him with a concept which integrates the information available. M.M.

A68-24757
PRESENTATION OF INFORMATION AND TASK LOAD.
Rüdiger Seifert.
(Western European Association for Aviation Psychology, Conference, 6th, The Hague, Netherlands, Sept. 7-10, 1965.)
Flight Safety, vol. 1, Spring 1967, p. 22-25. 14 refs.

Brief review of investigations of the problems of presenting information in the cockpit in such a way that minimum effort is needed to cope with it. It is pointed out that, the more complex man-machine systems grow, the more complex becomes the task of operating the overall system. Man is the crucial part of every man-machine system, since he handles information from most of the subsystems of the technical system. Whether he is performing functions such as sensing, identifying, making decisions, or activating controls, or whether he is monitoring or controlling a subsystem, man is a highly complex and variable data-processing link. M.M.

A68-24758
THE EFFECTS OF A STIMULANT DRUG ON AN AIR TRAFFIC CONTROL TASK.
L. R. C. Haward (Graylingwell Hospital, Chichester, Sussex, England).
Flight Safety, vol. 1, no. 2, 1967, p. 3-7. 46 refs.

Experimental investigation of the effects of a stimulant on an ATC task. The study led to the following findings: (1) efficiency in an ATC task becomes progressively impaired as a function of time; (2) the decrement in ATC efficiency becomes excessive after 90 min; (3) a 15-min rest interval provides good recovery of efficiency; (4) an inert substance has no significant effect on fatigue efficiency; (5) pemoline in 20-mg doses significantly reduces impaired efficiency due to fatigue; (6) no significant side effects were noted at the optimal dose; (7) progressively higher doses had less effect on fatigue decrement and finally, at the 50-mg triple doses, exacerbated the impairment; (8) side effects were noted at doses higher than the optimal one of 20 mg; and (9) pemoline was more effective than a rest period in reducing both the cumulative errors and the peak level of inefficiency. M.M.

A68-24759
CRITICAL REQUIREMENTS IN EVALUATING A.T.C. PROFICIENCY.
J. C. Helbing (Amsterdam, Universiteit, Amsterdam, Netherlands).
(Western European Association for Aviation Psychology, Conference, 6th, The Hague, Netherlands, Sept. 7-10, 1965.)
Flight Safety, vol. 1, no. 2, 1967, p. 10-16. 7 refs.

Analysis of the system used to evaluate the proficiency of ATC officers of the Royal Netherlands Air Force in order to provide insights into the characteristics of this system as an instrument, the basic dimensions in the frame of reference of the raters, and the critical requirements of the job of an ATC officer. The most important result regarding the second and third aspect of this analysis is that in the group of junior controllers two factors prove to be important in the evaluation: (1) the ability factor, with high loadings in general effectiveness and in the specific aspects of communication with air traffic, vigilance, distributive attention, speed of reaction, stability under stress, self-confidence, anticipation, and spatial orientation; this factor embraces the most critical job requirements; and (2) the second factor, which is of secondary importance for general proficiency, is the devotion factor, which has high loadings in professional knowledge, inspections and checks, accuracy in decision, keeping up with air traffic data, cooperation with other ground personnel, and interest. M.M.

A68-24760
THE USE OF SYMBOLS IN THE GROUND CONTROL OF AIRCRAFT.
H. C. W. Stockbridge.
Flight Safety, vol. 1, no. 2, 1967, p. 19-22. 5 refs. Abridged.

Experimental investigation of the fitness of signs to words. Two charts were derived from the results: a chart consisting of the most appropriate of the chosen symbols, and a chart based on the subjects' introspections and comments. These charts were then tested against each other in a learning situation. A shortened version of the second chart was tested in like manner against a chart based on understandable but arbitrary principles. The results obtained support the view that charts composed of more fitting signs are learned more quickly than the others, and point to the fact that the use of a matching technique is not equivalent to the employment of a learning situation. Of more importance to AT Controllers is the fact that the degree of confusion between aircraft symbols varies considerably with the type of symbol used. By adopting symbols which have the highest degree of concordance, controllers have a positive method of minimizing errors in identification and reducing the load on their own perceptual processes. M.M.

A68-24761
PSYCHOLOGICAL AND PSYCHIATRIC PROBLEMS IN AVIATION. I.
C. Blanc, E. Lafontaine, and R. Laplane (Compagnie Nationale Air France, Central Medical Dept., Paris, France).
Flight Safety, vol. 1, no. 3, 1968, p. 15-18. 25 refs.

Discussion of the nosographic distribution and etiological factors involved in psychological and psychiatric problems in aviation. The following concepts are stressed: (1) the majority of depressions and neuroses observed in two groups of subjects seem to have developed among personalities which, at the outset, possessed latent or objective neurotic traits which were not detected by the conventional medical examination at the time of recruitment; (2) psycho-affective factors are important in the tolerance to the constraints and fatigue

of aviation work; (3) the problem of the etiology of depressions and neuroses considered as a whole deserves to be specified in each population group; and (4) the recourse to psychopharmacology and, in particular, thymoanaleptics poses very delicate problems among flight personnel. M. M.

A68-24762
STRESS IN FLYING TRAINING.
L. R. C. Haward (Graylingwell Hospital, Chichester, Sussex, England).
Flight Safety, vol. 1, no. 3, 1968, p. 19-23. 20 refs.

Discussion of the stresses encountered by both service and commercial pilots, due to personal and professional, rather than technical reasons. Stress factors are frequently indicated as a source of flying accidents. These can be detected by in-flight recording of psychophysiological variables concomitantly with the monitoring of aircraft data, and analyzed subsequently by the traditional methods of clinical psychology. The use of this technique for the routine screening of commercial pilots is considered. The individual differences existing between civilian flying instructors in terms of their effects on the stress level of a student pilot are described. Low stress means safer flying, and the implications which these findings have for the selection of assistant flying instructors are briefly considered. M. M.

A68-24767 *
DELAYED RADIATION EFFECTS IN THE BRAINS OF MONKEYS EXPOSED TO X- AND γ-RAYS.
Webb Haymaker, M. Z. M. Ibrahim, Jaime Miquel, Nancy Call (NASA, Ames Research Center, Moffett Field, Calif.), and Arthur J. Riopelle (Tulane University, Delta Regional Primate Research Center, Covington, La.).
(American Association of Neuropathologists, Annual Meeting, Atlantic City, N.J., June 9, 1967.)
Journal of Neuropathology and Experimental Neurology, vol. 27, Jan. 1968, p. 50-79. 68 refs.

Study of the delayed pathological changes observed in the brains of monkeys receiving X- or γ-radiation to the head in a dose of about 2000 r given at 50 r/min. Latency of lesion development was between 13 and 17 weeks. White matter, cerebral cortex, and hypothalamic nuclei were damaged. The widest spectrum of lesion type was found in the white matter. Lesions often developed in relation to altered vessels. Glycogen-laden degenerating oligodendroglia were encountered in early stages of the inception of some of the lesions. Damage to these cells was considered dependent on vascular-circulatory factors. Vascular injury brought about by hemodynamic disturbances was, in all likehood, the overriding pathogenic factor in the development of the parenchymal lesions. M.F.

A68-24785
DETECTABILITY THEORY AND THE INTERPRETATION OF VIGILANCE DATA.
M. M. Taylor (Defence Research Board, Defence Research Medical Laboratories, Toronto, Canada).
Acta Psychologica, vol. 27, 1967, p. 390-399. 8 refs.

The concept of subjective probability forms the basis of a brief summary of the theory of discrimination. The concept of likelihood ratio is considered as an interpretive convenience, rather than as a conceptual necessity, and is used to introduce the familiar ROC curve. Interpretation of vigilance data is discussed in terms of the expected form of the relevant ROC curves. For the detection of signals in a steady background, the typical paradigm of a vigilance experiment, the ROC curve may be severely skewed. When the data depend on a single operating point, the tabulated indices of detectability, d', and of caution, β, may give misleading impressions of actual detection behavior. The tabulated value of β will always be higher than the true β, usually drastically so, while the tabulated value of d' will usually, but not always, be higher than the true value of d'. The tabulated values will show correlation, which may be either positive or negative, across observers in situations where the true values of d' and β would show no correlation. Though the tabulated measures may be of dubious value, the concepts of detection theory remain useful in the analysis of vigilance. (Author)

A68-24826
NOISE-DAMAGE CRITERION USING A WEIGHTING LEVELS.
Derwent M. A. Mercer (Southampton, University, Physics Dept., Southampton, England).
Acoustical Society of America, Journal, vol. 43, Mar. 1968, p. 636, 637.

Analysis showing, by considering a number of industrial noise spectra, that dbA levels can be satisfactorily used in practice. A level of 81 dbA or less is safe, and over 88 dbA dangerous. Intermediate levels need checking by analysis. M. F.

A68-25658
RADIOISOTOPE SURVIVAL SUIT HEATER.
Rufus W. Shivers (U.S. Atomic Energy Commission, Div. of Isotope Development, Washington, D.C.).
IN: NUCLEONICS IN AEROSPACE; PROCEEDINGS OF THE SECOND INTERNATIONAL SYMPOSIUM, COLUMBUS, OHIO, JULY 12-14, 1967. [A68-25634 11-14]
Symposium sponsored by the U.S. Air Force, the U.S. Atomic Energy Commission, and the Instrument Society of America. Edited by Paul Polishuk.
New York, Plenum Press, Division of Plenum Publishing Corp., 1968, p. 194-199. 7 refs.

Development of a radioisotope-heated fluid suit for the protection of underwater swimmers at low temperatures. This suit is to serve downed pilots in frigid waters, as well as Antarctic researchers who are exposed to extreme cold and need a portable, self-contained heating system. The same type of equipment could be used by an astronaut spending a lunar night on the moon. The heater unit is built mainly of aluminum and polyvinylchloride (PVC) and consists of a heat-exchanger unit, heat-exchanging fluid (tap or distilled water), a battery-powered pump, two temperature-control valves, a bypass coil, fluid transfer lines, and thermal insulation. The heat exchanger consists of a vacuum bottle assembly four heat sources each of which supply approximately 105 watts of thermal power, a capsule support assembly, and a feed-through assembly. The heater assembly is 12 in. long and 4 in. in diameter and weighs approximately 20 lb. P.v.T.

A68-25927 *
COMPARISON OF SENSITIVITY FOR THE PERCEPTION OF BODILY ROTATION AND THE OCULOGYRAL ILLUSION.
Brant Clark and John D. Stewart (NASA, Ames Research Center, Moffett Field, Calif.).
Perception and Psychophysics, vol. 3, no. 4A, 1968, p. 253-256. 22 refs.

The purpose of the study was to compare the sensitivity of humans to angular acceleration using the perception of rotation and the perception of the oculogyral illusion as two indicators. Ten men with normal vestibular function were studied in a precision rotation device using a random, forced choice, double-staircase method to determine the thresholds. The thresholds for the oculogyral illusion were found to be substantially and significantly lower than thresholds for the perception of rotation. The implications of these findings for an understanding of the oculogyral illusion are discussed. (Author)

A68-26115 *
OBSERVATIONS ON THE PRESENCE OF TITANIUM AND ZINC IN HUMAN LEUCOCYTES.
Kenneth G. Carroll (NASA, Electronics Research Center, Cambridge, Mass.) and James L. Tullis (New England Deaconess Hospital, Dept. of Medicine; Blood Research Institute, Cytology Laboratory, Boston, Mass.).
Nature, vol. 217, Mar. 23, 1968, p. 1172, 1173. 5 refs.
NIH-supported research.

Study of the use of the electron-probe microanalyzer in analysis of the metal content of normal and malignant blood cells. The instrument used had an optical magnification of 400 diameters with a resolving power of about 0.5 μ. Specimens of whole blood, bone marrow and lymph nodes were obtained from human sources and examined. During a study of the intracellular cation content of

human erythrocytes subject to dialysis after removal from the frozen state, the metal content of leucocytes which contaminated the specimens was also investigated. Unexpectedly large amounts of titanium and zinc were occasionally found. Initial tests on blood of a subject with predominantly lymphoblastic forms in the circulating blood gave clear evidence of the presence of high concentrations of titanium and zinc in many cells. This was substantiated by similar findings in three additional cases. P.v.T.

A68-26116
IMMEDIATE CIRCULATORY RESPONSE TO HIGH ALTITUDE HYPOXIA IN MAN.
Sujoy B. Roy, J. S. Guleria, P. K. Khanna, J. R. Talwar, S. C. Manchanda, J. N. Pande, V. S. Kaushik, P. S. Subba, and J. E. Wood (All India Institute of Medical Sciences; Armed Forces Medical Services, Office of the Director-General, New Delhi, India).
Nature, vol. 217, Mar. 23, 1968, p. 1177, 1178. 10 refs.

Study of the acute circulatory response to high altitude hypoxia and of the extent to which any drifts in the circulating blood volumes could be related to the time lag and clinical features of acute mountain sickness and high altitude pulmonary oedema. These two acute illnesses represent problems for troops in the Himalayan terrain who frequently shuttle between sea level and high altitudes (10,000 to 16,000 ft). For tests, 30 healthy volunteers between 17 and 32 years of age were selected from the Indian Army. It was concluded from the tests that the time lag for the onset of the illnesses and such features as headache, muscular cramps and pulmonary congestion as seen in acute mountain sickness and high altitude pulmonary oedema may be related to the shifts of the circulating blood volumes and the fall in the arterial P_{O_2}, and P_{CO_2} with rise in pH. P.v.T.

A68-26117 *
STRUCTURE AND FUNCTION OF E. COLI RIBOSOMES. IV - ISOLATION AND CHARACTERIZATION OF FUNCTIONALLY ACTIVE RIBOSOMAL PROTEINS.
P. Traub, K. Hosokawa, G. R. Craven, and M. Nomura (Wisconsin, University, Laboratory of Genetics and Laboratory of Molecular Biology, Madison, Wis.; California, University, Space Science Laboratory, Berkeley, Calif.).
National Academy of Sciences, Proceedings, vol. 58, Dec. 1967, p. 2430-2436. 28 refs.
NIH Grants No. GM-14651; No. GM-15422; No. GM-12932; Grants No. NsG-479; No. NsG-05-003-020.

Description of experiments designed to identify all the molecular components of E. coli ribosomes and to relate their properties to the overall function of the organelle in protein synthesis. Artificial ribosome derivatives deficient in one specific component were prepared, and the alteration of the functions in these ribosome derivatives was examined. The results of the experiments show that two of the split proteins and possibly a third are essential for amino acid incorporation, as well as for specific aminoacyl-tRNA binding. R.B.S.

A68-26129 *
CORRELATION OF RETICULAR AND COCHLEAR MULTIPLE UNIT ACTIVITY WITH AUDITORY EVOKED RESPONSES DURING WAKEFULNESS AND SLEEP. I.
Wallace D. Winters, Kenjiro Mori, Charles E. Spooner, and Raymond T. Kado (California, University, School of Medicine, Brain Research Institute and Dept. of Pharmacology, Los Angeles, Calif.).
Electroencephalography and Clinical Neurophysiology, vol. 23, 1967, p. 539-545. 25 refs.
PHS Grants No. 5 TI-MH-6415-08; No. 1 RO1-MH-12121-01; No. 1 PO7-FR-0257-02; Grants No. NsG-237-62; No. NsG-05-007-003.

Comparison of the multiple unit activity of an auditory specific sensory nucleus (the dorsal cochlear nucleus) with that of the non-specific midbrain reticular system for the purpose of analyzing the possible role of reticular control on behavior, EEG, and sensory input systems during wakefulness and sleep. The results indicate that the input stimulus is modulated at a level peripheral to the cochlear nucleus, presumably by the reticular influence on this system. T.M.

A68-26130 *
HABITUATION OF EVOKED POTENTIALS IN THE RAT UNDER CONDITIONS OF BEHAVIORAL CONTROL.
Robert D. Hall (Massachusetts Institute of Technology, Center for Communication Sciences and Research Laboratory of Electronics, Cambridge, Mass.).
Electroencephalography and Clinical Neurophysiology, vol. 24, 1968, p. 155-165. 55 refs.
NIH Grant No. 1 PO1-GM-14940-01; Grants No. NsG-496; No. NsG-22-009-019; Contract No. DA-28-043-AMC-02536(E).

Study of three experiments in which potentials evoked by sensory stimuli were recorded from rats during habituation procedures. In all three experiments, behavior was controlled through the use of appetitive operant conditioning procedures. Constant rates of behavioral responding provided a control against fluctuations in the level of arousal, and the nature of the behavioral responses ensured a relatively constant orientation of the subjects with respect to the stimuli. Average evoked responses revealed the following: (1) photically evoked potentials recorded from visual cortex exhibited habituation, and the amplitude reductions were confined to late components of the evoked response; (2) click-evoked potentials recorded from the auditory cortex and the medial geniculate body also showed reductions in amplitude during repetitive stimulation; and (3) click-evoked potentials recorded from the inferior colliculus, ventral cochlear nucleus, and reticular formation did not show consistent evidence of habituation. It is concluded that habituation of evoked potentials occurs in the classical sensory pathways, but is probably restricted to cortical and thalamic levels of the sensory systems. R.B.S.

A68-26133 *
DIVISION DELAY INDUCED IN ESCHERICHIA COLI BY NEAR-ULTRAVIOLET RADIATION.
Stephen L. Phillips, Stanley Person, and John Jagger (Pennsylvania State University, Dept. of Biophysics, University Park, Pa.; South west Center for Advanced Studies, Dallas, Tex.).
Journal of Bacteriology, vol. 94, July 1967, p. 165,170. 14 refs.
PHS Grant No. 1 RO1-AI06971; Grants No. NsG 324; No. NsG-39-009-008.

Experimental investigation in which beams of near-UV radiation at several principal emission lines of a mercury arc were isolated with a grating monochromator and directed upon cell suspensions. During subsequent incubation at room temperature in Nutrient Broth, the population was studied by removing samples and obtaining cell numbers and cell-size distributions with an electronic cell counter. Division delay without lethality was observed. The shapes of the dose-response curves for induction, the doses of UV radiation required, and the action spectrum for division delay were found to be similar to those for growth delay and for photoprotection. These findings indicate that all three effects, division delay, growth delay, and photoprotection, are induced by a common type of critical event. Changes in cell-size distribution in the culture during incubation in Nutrient Broth after near-UV irradiation are very similar for control and irradiated populations, although these changes occur at a much later time in the irradiated population. This indicates that, in Nutrient Broth, the population recovers completely from the inhibition of growth and division, thus justifying the use of the term delay, and suggesting that the damage is nongenetic. M.M.

A68-26151 *
HYPOTHESIS BEHAVIOR IN A CONCEPT-LEARNING TASK WITH PROBABILISTIC FEEDBACK.
Steven P. Rogers and Robert C. Haygood (Kansas State University of Agriculture and Applied Science, Manhattan, Kan.).
Journal of Experimental Psychology, vol. 76, no. 1, 1968, p. 160-165. 13 refs.
PHS Grant No. MH-11283; Grants No. NsG(T)-54; No. NsG(T)-17-001-002.

Predictions based on assumptions of recent mathematical models for concept learning were tested in a concept-learning task with probabilistic feedback. Subjects' verbalized hypotheses were examined at five-trial intervals. The results failed to support the model assumptions in that a large proportion of hypothesis changes occurred in the absence of errors and a large proportion of hypothesis reten-

tions occurred following errors. A correlation of +0.61 was found between total errors and total hypothesis changes under misinformation feedback conditions, but where the total number of errors was held constant by making feedback independent of subjects' responses, error rate had no significant effect on rate of hypothesis changes. The results suggest that subjects pass through distinct stages in solution of a concept-learning problem. (Author)

A68-26187 #
FEATURES OF SURGICAL INTERVENTION UNDER CONDITIONS OF WEIGHTLESSNESS [OSOBENNOSTI OPERATIVNOGO VMESHATEL'STVA V USLOVIIAKH NEVESOMOSTI].
G. L. Iaroshenko, V. G. Terent'ev, and M. N. Mokrov.
Voenno-Meditsinskii Zhurnal, Oct. 1967, p. 69, 70. In Russian.

Experimental study of the effects of surgical intervention involving laparotomy on rabbits under the conditions of weightlessness. The results discussed include the features of blood flow, the use of anesthetics, the contamination of the atmosphere, and the optimum size of intestinal incisions. Care should be exercised to avoid air contamination of the injection fluids. T.M.

A68-26310 *
THE FINE STRUCTURE OF THE BACTERIAL CELL AND THE POSSIBILITY OF ITS ARTIFICIAL SYNTHESIS.
Ernest C. Pollard (Pennsylvania State University, University Park, Pa.).
IN: SCIENCE IN PROGRESS. 16TH SERIES.
New Haven and London, Yale University Press, 1967, p. 133-170. 22 refs.
Grants No. NsG-324; No. NsG-39-009-008.

Description of the fine structure of a bacterial cell together with an analysis of the mechanisms involved in its functional operation and the possibility of its artificial synthesis. The nature of the DNA and the RNA in the bacterial cell is discussed and their location in the cell is examined. Use is made of electron micrographs to illustrate the structure which is mainly described in terms of schematic diagrams intended as an aid to imaginary representation. Considerable attention is given to the ordered synthesis in the cell involving the formation of RNA and subsequent protein synthesis. Possibilities of artificial synthesis are evaluated on the basis of the proposed mechanisms. T.M.

A68-26632 *
CIRCADIAN OSCILLATIONS OF DEEP-BODY TEMPERATURE AND HEART RATE IN A PRIMATE (CEBUS ALBAFRONS).
C. M. Vinget, D. H. Card, and N. W. Hetherington (NASA, Ames Research Center, Environmental Biology Div. and Computation Div., Moffett Field, Calif.).
(AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM, p. 45, 46.)
Aerospace Medicine, vol. 39, Apr. 1968, p. 350-353. 14 refs.
[For abstract see issue 23, page 3951, Accession no. A67-41554]

A68-26634 #
NEOPLASTIC SKIN RESPONSE OF RATS AFTER 13 MEV PROTON IRRADIATION.
Harold W. Casey, John E. Prince, Donald K. Hinkle, Bobby L. Caraway, and William T. Williams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Brooks AFB, Tex.).
Aerospace Medicine, vol. 39, Apr. 1968, p. 360-365. 21 refs.

Study of skin neoplasms in rats that received 13 Mev proton whole-body radiation. Three groups of rats were irradiated with a single dose from 100 to 2500 rads, and were observed for 8, 21, and 30 months post-irradiation. A total of 121 neoplasms were diagnosed in 79 irradiated rats. Of 121 neoplasms that occurred in the irradiated rats, 117 developed in the skin and a high percentage of these tumors were considered radiation induced. The incidence of neoplasia could not be related to the magnitude of the radiation dose since doses as low as 200 rads produced a high tumor incidence. Both epithelial and mesenchymal tumors were detected. Squamous cell carcinomas, basal cell tumors, fibrosarcomas, and fibromas were the most common neoplasms diagnosed. P.v.T.

A68-26635
SIMULATED ALTITUDE AND IODINE METABOLISM IN RATS. II - EFFECTS OF CHRONIC EXPOSURE ON SERUM AND THYROID IODINATED COMPONENTS; EFFECTS ON BLOOD FRACTIONS AND SOME ORGAN WEIGHTS.
Clarence L. Johnson (Western Fish Nutrition Laboratory, Cook, Wash.) and Gilles LaRoche (National Marine Water Quality Laboratory, West Kingston, R.I.).
Aerospace Medicine, vol. 39, Apr. 1968, p. 365-375. 47 refs.

Determination of the state of the thyroid gland in rats after prolonged exposure to reduced barometric pressure. Seventy-five adult male albino rats were subjected to a simulated altitude of 18,000 ft for six weeks, followed by an injection of 53 μc of carrier-free iodide (^{125}I) for an evaluation of the thyroid gland. Results of the tests indicate that altitude exposure induces hyperthyroidism in rats. R.B.S.

A68-26636 *
THE SPACE ACTIVITY SUIT - AN ELASTIC LEOTARD FOR EXTRA-VEHICULAR ACTIVITY.
Paul Webb (Webb Associates, Inc., Yellow Springs, Ohio).
Aerospace Medicine, vol. 39, Apr. 1968, p. 376-383. 22 refs.
Contract No. NAS 1-6872.

Description of a space activity suit consisting of a powerful elastic leotard to counter the circulatory effects of breathing oxygen at a pressure of 170 mm Hg. The physiological basis for such a garment is discussed, and the advantages offered by the suit compared to gas-filled pressure suits are outlined. Tests show that mobility and dexterity were not impaired by use of the suit. Some problems raised by the use of such a suit are examined. R.B.S.

A68-26637 *
CIRCADIAN VARIABILITY IN VIGILANCE PERFORMANCE.
Thomas W. Frazier (U.S. Army, Walter Reed Army Institute of Research, Washington, D.C.; NASA, Manned Spacecraft Center, Houston, Tex.), John A. Rummel, and Harry S. Lipscomb (NASA, Manned Spacecraft Center; Baylor University, College of Medicine, Houston, Tex.).
Aerospace Medicine, vol. 39, Apr. 1968, p. 383-395. 8 refs.
Grant No. NGR-44-003-025.

Least-squares spectral analyses of vigilance performance by three human test subjects over a 14-day confinement period in a highly controlled experimental environment revealed clear evidence of circadian rhythmicity. Four performance tasks associated with vigilance measurement were administered on four equally spaced occasions during each day of the test. Circadian rhythmicity was identified in every measure employed, but individual circadian periods showed clear nonstationarity as time progressed, with periods ranging considerably above and below 24 hr. This finding raises some questions regarding the common practice of using time-of-day control for eliminating circadian periodicity as a source of error variability and questions regarding whether circadian variation might account for vigilance performance changes previously associated with length of a monitoring vigil. The results also suggested that confinement stress can lead to alterations of circadian rhythmicity, even when the physical environment and activity schedule are held highly constant. (Author)

A68-26638 *#
HUMAN WATER CONSUMPTION AND EXCRETION DATA FOR AEROSPACE SYSTEMS.
H. T. Mohlman, A. R. Slonim (Dayton, University, Miami Valley Hospital, Dayton; USAF, Systems Command, Aerospace Medical Div., Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio), and B. J. Katchman (Dayton, University, Dayton, Ohio).

Aerospace Medicine, vol. 39, Apr. 1968, p. 396-402. 18 refs.
NASA Contract No. R-85; Contracts No. AF 33(657)-11716;
No. AF 33(615)-2182.

The effects of different test diets and simulated space conditions on the water consumption and output of 40 subjects utilized in a series of 11 experiments under controlled environmental conditions were examined. Ad lib and total water intake were not altered by either dehydrated food, liquid food, continuously wearing pressure suits, or confinement in a 30-m^3 chamber facility. An increase of 9°C in environmental temperature caused a threefold increase in both ad lib water intake and insensible water loss and nearly doubled the total water intake. In four of eight ambient environment experiments, the mean ad lib water intake was less than 1 liter; in two experiments, the mean total water intake was in the 1.5- to 1.8-liter range. In the last experiments of the series, pressurization in a full pressure suit with a pressure differential of 3.7 psi for four to five days caused a decrease in insensible water loss. The subjects subsisted on a 900-calorie diet containing less than 50 mliter of water and had a total water intake ranging from 0.68 to 1.30 liters per day. Insensible water loss and urine/total water index data were computed for all experiments. These data provide a means for assessing water balance under simulated space conditions.

(Author)

A68-26639

EFFECTS OF ALCOHOL AND ALTITUDE ON MAN DURING REST AND WORK.

Richard B. Mazess (Wisconsin, University, Dept. of Anthropology and Dept. of Radiology, Madison, Wis.), Emilio Picon-Reategui (Instituto de Biologia Andina, Lima, Peru), R. Brooke Thomas (Pennsylvania State University, Anthropology Laboratory, University Park, Pa.), and Michael A. Little (Ohio State University, Dept. of Anthropology, Columbus, Ohio).

Aerospace Medicine, vol. 39, Apr. 1968, p. 403-406. 26 refs.
Contract No. DA-49-193-MD-2260.

The effect of a moderate dose of alcohol (0.6 g/kg body weight) was investigated during rest and submaximal work (1000 kpm/min) in four subjects at sea level and after 23 days at altitude (4000 m). A similar dose also was investigated in 8 acclimatized subjects at 4000 m. Heart rates, ventilation, oxygen intakes, and subjective difficulties before, during, and after exercise were increased by alcohol above control levels only at high altitude. The physiologica effects of alcohol were greater in the acclimatized subjects than in newcomers.

(Author)

A68-26640 *

PATHOPHYSIOLOGY OF AEROEMBOLISM FOLLOWING INTRAVENOUS INJECTION OF OXYGEN.

A. T. K. Cockett, Ned L. Mangelson, and R. T. Kado (Harbor General Hospital, Dept. of Surgery/Urology, Torrance; California University, School of Medicine, Los Angeles, Calif.).

Aerospace Medicine, vol. 39, Apr. 1968, p. 407-410. 10 refs.
PHS Grant No. HE 09834-02; Contracts No. NR-00014-66-C-0295;
No. NR-102-669; Grant No. NsG-237-62.

Intravenous atropine in high concentrations (0.27 to 0.4 mg/kg) may protect dogs from fatal venous and pulmonary arterial oxygen emboli if drug administration is immediate. The protective role of parasympathetic blockade with tachycardia and the ultimate dispersion of oxygen is discussed. Methylsiloxane (antifoam A) when given alone did not protect the experimental animal. However, methylsiloxane in combination with intravenous atropine appeared to be as beneficial as atropine alone. Injection of oxygen emboli into the right heart and its similarity to catastrophic results seen not infrequently following selected surgical procedures in patients are discussed.

(Author)

A68-26641 #

ACUTE HEAT STRESS WITHOUT BURNS AND HUMAN RED BLOOD CELLS.

Neil Abramson (USAF, Systems Command, Aerospace Medical Div. Aerospace Medical Research Laboratories, Biomedical Laboratory Environmental Medicine Div., Environmental Physiology Branch, Wright-Patterson AFB, Ohio).

Aerospace Medicine, vol. 39, Apr. 1968, p. 413-416. 23 refs.

The in vivo effect of short-duration heat stress upon human red cells was studied. Eight subjects were exposed to tolerance (30 to 60 min) at 71°C, 4 to 6 mm Hg vapor pressure. Venous blood, prior to and after heat exposure, was measured for hematocrit, hemoglobin, red cell count, red cell indices, morphology, osmotic fragility (Dacie Method), and mechanical fragility. Hemoglobin, hematocrit, and red cell counts were significantly elevated ($p < 0.05$) after the heat exposure without changes in indices or morphology. An increase in osmotic fragility after heat stress was noted ($p < 0.05$) when compared to prestress bloods. Mechanical fragilities were unchanged as a function of heat stress. After 24-hr incubation of prestress and poststress blood (anticoagulated with oxalate), poststress specimens were significantly less osmotically fragile ($p < 0.05$) than prestress specimens; however, these results could not be confirmed on heparinized or defibrinated bloods. Acute heat stress without cutaneous burns causes alterations in blood counts consistent with dehydration. The increases in osmotic fragility after heat stress were not accompanied by morphologic alterations. In this respect, "burn hemolysis" differs from in vivo thermal effects.

(Author)

A68-26642

ABSORPTION OF GASES FROM THE ANTERIOR CHAMBER OF THE EYE - AEROMEDICAL IMPLICATIONS.

Torrence A. Makley, Jr. and Charles E. Billings (Ohio State University, Dept. of Ophthalmology and Dept. of Preventive Medicine, Columbus, Ohio).

(AEROSPACE MEDICAL ASSOCIATION, 1967 ANNUAL SCIENTIFIC MEETING, WASHINGTON, D.C., APRIL 10-13, 1967, PREPRINTS OF SCIENTIFIC PROGRAM, p. 3, 4.)
Aerospace Medicine, vol. 39, Apr. 1968, p. 425, 426. 9 refs.
NIH Grant No. EF-00036-04.

[For abstract see issue 23, page 3950, Accession no. A67-41536]

A68-26667

LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS.

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by F. J. Malina (Académie Internationale d'Astronautique, Paris, France).
Oxford, Pergamon Press, Ltd., 1967. 127 p. In English and French. $10.00.

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VISUAL PERFORMANCE ON THE MOON. J. H. Taylor (California, University, La Jolla, Calif.), p. 75-82. [See A68-26674 12-05]

RADIATION HAZARDS TO MAN ON THE MOON. H. J. Schaefer (U. S. Naval Aviation Medical Center, Pensacola, Fla.), p. 83-95. 11 refs. [See A68-26675 12-04]

SOME FEATURES OF LIQUID MOTION AT ZERO GRAVITY. A. S. Povitskii and L. Ia. Liubin (Akademiia Nauk SSSR, Moscow, USSR), p. 97-111. 16 refs. [See A68-26676 12-12]

LUNAR MEDICINE. Hubertus Strughold (USAF, Systems Command, Brooks AFB, Tex.), p. 113-121. 19 refs. [See A68-26677 12-05]

A68-26668

PHYSIOLOGICAL ASPECTS OF THE TRANSITION FROM SPACE VEHICLE TO LUNAR ENVIRONMENT.

H. Bjurstedt (Royal Caroline Institute, Dept. of Aviation Medicine, Stockholm, Sweden).

IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by F. J. Malina.

Oxford, Pergamon Press, Ltd., 1967, p. 1-10. 21 refs.

Brief review of some of the basic requirements for long-term habitability in the sealed environment of a lunar laboratory and under the influence of the lunar subgravitational field. The selection of a proper atmosphere is discussed against the background of physiological and technological requirements. The advantages and limitations of single- and mixed-gas atmospheres as breathing media are described in some detail. The need for additional research of specific points within this area, most of which can be performed in earth-based laboratories, is emphasized. It is pointed out that the physiological effects that may result from long-term exposure to the lunar subgravitational field are as yet unknown. They can at best be extrapolated with some uncertainty from known data on the effects of prolonged weightlessness so far accumulated as part of the manned space-flight experience. M.M.

A68-26669

PSYCHO-SOCIOLOGICAL PROBLEMS OF SMALL, ISOLATED GROUPS WORKING UNDER EXTREME CONDITIONS [PROBLEMES PSYCHOSOCIOLOGIQUES DES PETITS GROUPES ISOLES TRAVAILLANT DANS DES CONDITIONS EXTREMES].

R. Angiboust (Ministère de l'Air, Mont-de-Marsan, Landes, France).

(International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966.)

IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by F. J. Malina.

Oxford, Pergamon Press, Ltd., 1967, p. 11-20. 10 refs. In French.

[For abstract see issue 02, page 185, Accession no. A67-12374]

A68-26670

LIFE-SUPPORT SYSTEMS ON THE MOON.

R. C. Armstrong and C. D. King (General Dynamics Corp., Convair Div., San Diego, Calif.).

(International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966.)

IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by F. J. Malina.

Oxford, Pergamon Press, Ltd., 1967, p. 21-38. 17 refs.

[For abstract see issue 02, page 230, Accession no. A67-12310]

A68-26671

THE CONSTRUCTION OF A LUNAR MICROCOSM.

N. W. Pirie (Commonwealth Bureau of Soils, Rothamsted Experimental Station, Harpenden, Herts., England).

(International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966.)

IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by F. J. Malina.

Oxford, Pergamon Press, Ltd., 1967, p. 39-50. 26 refs.

[For abstract see issue 02, page 185, Accession no. A67-12313]

A68-26672

HUMAN LOCOMOTION AT REDUCED GRAVITY.

R. Margaria, G. Cavagna, and H. Saiki (Milano, Università, Istituto di Fisiologia Umana, Milan, Italy).

IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]

Symposium supported by the United Nations Educational, Scientific and Cultural Organization.

Edited by F. J. Malina.

Oxford, Pergamon Press, Ltd., 1967, p. 55-62. 7 refs.

Research supported by the Consiglio Nazionale delle Ricerche.

Discussion of the problem of human locomotion in subgravity, noting that in spite of the fact that when a man is walking or running on the flat the direction of movement is perpendicular to that of the gravitational force, this force appears to be one of the main factors responsible for progression. It has been shown that when walking the potential-energy changes of the body, as given by the vertical oscillation of the center of gravity, and the kinetic-energy changes, calculated by the velocity changes at each step, are in opposition, thus showing that potential energy is transformed into kinetic energy and vice versa. The vertical component of the push of the foot on the ground greatly predominates over the horizontal component, the latter becoming appreciable only when walking or running at high speed. In other words, the kinetic-energy changes are obtained to a substantial amount only through a gain of potential energy, and the work accomplished by the muscles is therefore mainly anti-gravitational. Such a transfer from potential to kinetic energy takes place with some energy loss, which accounts for energy expenditure in maintaining speed in level locomotion. At reduced gravity, this anti-gravitational work will be correspondingly reduced, and less energy will be available for speed maintenance. In fact, for a given speed of progression, the velocity changes at each step seem to be constant and independent of the gravitational force; if this force decreases, the decreased potential-energy changes will be inadequate to meet the kinetic energy requirement, except at very low speed of walking. Weights added to increase the potential energy of the body will not improve the situation, as the kinetic-energy changes, required for speed maintenance, will correspondingly increase. To take full advantage of muscular force and power, another mechanism of locomotion, mainly jumping, is considered. This becomes convenient on the moon because the muscular force will greatly exceed the resistance offered by the reduced weight of the body. M.M.

A68-26673 *

MAN'S LUNAR EXTRA VEHICULAR CAPABILITIES.

W. Kuehnegger and Ch. J. Martell (Northrop Corp., Northrop Norair, Northrop Space Laboratories, Life Sciences Section, Hawthorne, Calif.)

(International Astronautical Federation, International Astronautical Congress, 17th, Madrid, Spain, Oct. 9-15, 1966.)
IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]
Symposium supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by F. J. Malina.
Oxford, Pergamon Press, Ltd., 1967, p. 63-73.
Contract No. NAS 1-4449.
[For abstract see issue 02, page 189, Accession no. A67-12393]

A68-26674
VISUAL PERFORMANCE ON THE MOON.
J. H. Taylor (California, University, Scripps Institution of Oceanography, Visibility Laboratory, La Jolla, Calif.).
IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]
Symposium supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by F. J. Malina.
Oxford, Pergamon Press, Ltd., 1967, p. 75-82.

Observation that the visual environment which will confront man on the lunar surface has no naturally occurring terrestrial counterpart and that man will be required to perform a wide variety of tasks which depend heavily on his visual sense. It is therefore important that his capabilities and limitations be realistically evaluated before he embarks on a lunar mission. The photometric and morphological properties of the lunar surface have been intensively studied, both from telescopes on the earth, which permit large-scale measurements, and from the Lunik, Ranger and Surveyor vehicles which are yielding small-scale data from necessarily small samples of the surface. It is apparent from available information that many of the visual cues by which we ordinarily function will be absent or modified on the moon. The judgment of size, distance and color of lunar features, for example, will have to be made in the absence of aerial perspective, reference objects and other cues that we habitually use in terrestrial situations. In addition, harsh luminance contrasts will both distort the judgment of size and penalize visual performance. The absolute necessity for pressure helmets and eye-protective visors will result in further reduction of vision, and these must be designed to minimize optical and chromatic distortions that might endanger the man or compromise the scientific value of the mission. It is pointed out that the selection and training of any man for lunar exploration should give due regard to his ability to perform useful work with maximum safety.
M. M.

A68-26675 *
RADIATION HAZARDS TO MAN ON THE MOON.
H. J. Schaefer (U.S. Naval Aviation Medical Center, Aerospace Medical Institute, Pensacola, Fla.).
IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]
Symposium supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by F. J. Malina.
Oxford, Pergamon Press, Ltd., 1967. p. 83-95. 11 refs.
NASA-sponsored research.

Discussion of dangers due to radiation for man on the moon. It is noted that since man will always need a pressurized enclosure on the moon, radiation spectra are of interest only above a certain minimum penetrating power corresponding to the shielding equivalent of the enclosure. For galactic radiation, the lack of an atmosphere means that buildup (multiple production of secondaries) will occur on the moon in the material of a space suit, a vehicle, or a permanent building. Exposure conditions for solar particle beams will not differ basically from those in free space except for the shielding effect of the lunar body. The estimates made by many investigators for free space conditions therefore hold essentially also for the lunar surface. Substantial flare protection could be accomplished by using features of the lunar terrain such as narrow valleys or caves. At a state of a more advanced lunar technology, flare radiation shelters could be dug out.
M.M.

A68-26677
LUNAR MEDICINE.
Hubertus Strughold (USAF, Systems Command, Aerospace Medical Div., Brooks AFB, Tex.).
IN: LIFE SCIENCES RESEARCH AND LUNAR MEDICINE; INTERNATIONAL ACADEMY OF ASTRONAUTICS, INTERNATIONAL ASTRONAUTICAL CONGRESS, 17TH, LUNAR INTERNATIONAL LABORATORY SYMPOSIUM, 2ND, MADRID, SPAIN, OCTOBER 13, 1966, PROCEEDINGS. [A68-26667 12-05]
Symposium supported by the United Nations Educational, Scientific and Cultural Organization.
Edited by F. J. Malina.
Oxford, Pergamon Press, Ltd., 1967, p. 113-121. 19 refs.

Contrast of the high-level homeostasis of the human body with the low-to-zero level ecological milieu on the moon, following consideration of some ecological aspects in circumlunar orbit. The environmental requirements within a lunar laboratory for maintenance of homeostatic balance are discussed. Special attention is given to the cardiovascular and automatic nervous systems under lunar gravity and the proper regulation of the astronauts' physiological clocks. Concerning extravehicular excursions, the part played by the extralabyrinthine peripheral mechano-receptors in the skin, in the muscles, and in the connective tissue for the balance of position and movement is emphasized, as well as the involvement of the proprio-reflexes of the muscles of the legs, and the way in which equilibrium during walking can be facilitated by these reflexes. Hazards presented to the eye by solar irradiance, and means of preventing eye damage of this nature are discussed. Comment is made about earthshine on the moon, and "earth illusion." Some comparisons are made between the lunar and Martian environment.
F.R.L.

A68-26728 *
THE EFFECTS OF WEIGHTLESSNESS ON PLANT GROWTH.
H. M. Conrad and S. P. Johnson (North American Rockwell Corp., Space and Information Systems Div., El Segundo, Calif.).
Journal of Environmental Sciences, vol. 11, Apr. 1968, p. 17-24. 15 refs.
Contracts No. NAS 2-3321; No. NAS 2-3323.

Discussion of the Biosatellite Program, a NASA project designed to answer fundamental questions concerning life in space, by using recoverable unmanned vehicles carrying plant specimens under conditions of a specially provided uniform gravitational field. The program includes a launching in which, on Dec. 14, 1966, the vehicle was not recovered due to a mechanical failure, and a launching scheduled for midsummer of 1967. Experiments with pepper plants and wheat seedlings, designed to determine the effect of a space environment on plant behavior and growth, are described. The response of these plants to simulated space-flight conditions is reviewed.
V.Z.

A68-26743 #
MEDICAL ASPECTS.
G. Bennett (Board of Trade, London, England).
IN: THE SST; BRITISH AIR LINE PILOTS ASSOCIATION, TECHNICAL SYMPOSIUM, LONDON, ENGLAND, NOVEMBER 28-30, 1967, PAPERS. [A68-26734 12-02]
Hayes, Middx., England, British Air Line Pilots Association, 1967, p. 116-122.

Discussion of the medical aspects of failure of pressurization of the SST, and the effects of ozone, radiation, and UV on passengers and crew. It is considered that pressurization systems are going

to be more reliable than in the past. Ozone should not be a serious problem, because it breaks down into oxygen by being heated during compression and passage through the cabin ducting. The Concorde will be fitted with a radiation detector. UV is not considered to be a problem, because the window materials give sufficient attenuation. Effects of acceleration and problems of air conditioning are discussed. Attention is given to crew work load, crew qualifications, crash worthiness, and problems of noise and sonic boom. F. R. L.

A68-26747 *

PAUSE RELATIONSHIPS IN MULTIPLE AND CHAINED FIXED-RATIO SCHEDULES.

E. K. Crossman (NASA, Ames Research Center, Moffett Field, Calif.).

Journal of the Experimental Analysis of Behavior, vol. 11, Mar. 1968, p. 117-126. 12 refs.

Investigation of pause relationships for pigeons on a multiple fixed-ratio 10 fixed-ratio 100 schedule. The percentage of fixed-ratio 10 components which included reinforcement was gradually decreased for birds on the multiple schedule, and gradually increased for birds on the chained schedule. It was found that percentage reinforcement within the fixed-ratio 10 component was inversely related to the duration of the pause before the fixed-ratio 10 component and directly related to the duration of the pause before the fixed-ratio 100 component. M. G.

A68-26766 *

ALLOSTERIC REGULATION OF PHOSPHORIBULOKINASE ACTIVITY.

Robert D. MacElroy (NASA, Ames Research Center, Exobiology Div., Moffett Field, Calif.), E. J. Johnson, and M. K. Johnson (Tulane University, Medical School, Dept. of Microbiology, New Orleans, La.).

Biochemical and Biophysical Research Communications, vol. 30, no. 6, 1968, p. 678-682. 10 refs.

Indication that in Thiobacillus thioparus the substance phosphoribulokinase is cooperatively affected by adenosine triphosphate, and that the inhibition of the enzyme by adenosine monophosphate may not be solely competitive. T. thioparus was grown with continuous neutralization at 30°C, and phosphoribulokinase activity was determined at 37°C with a Gilford spectrophotometer according to the method of Hurwitz (1962). Velocity vs substrate plots made at saturating concentrations of ribulose-5-phosphate and with varying concentrations of ATP are presented. R. B. S.

A68-27507 *

TELESTIMULATION OF THE PRIMATE BRAIN.

Bryan W. Robinson (Emory University, Emory Rehabilitation and Training Center and Yerkes Regional Primate Research Center, Laboratory of Neurophysiology, Atlanta, Ga.) and Hal Warner (Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.).

(American Academy of Physical Medicine and Rehabilitation, Annual Assembly, 28th, San Francisco, Calif., Aug. 29, 1966.)
Archives of Physical Medicine and Rehabilitation, vol. 48, Sept. 1967, p. 467-473. 8 refs.
Grant No. NGR-11-001-012.

Study of electrically evoked behavioral responses in animals free of the restraint imposed by wire connections with laboratory instrumentation. The utilized remote-control technique with constant-current telestimulation of the monkey brain is described. The technique allows remote control of both electrode-channel selection and pulse-current amplitude in addition to pulse duration and repetition rate. Certain behavioral patterns are evoked in monkeys with telestimulation. V. Z.

A68-27021 *

THE MISSION CONTROL CENTER BIOMEDICAL DATA ANALYSIS AND DISPLAY SYSTEM.

Frank J. Wancho (NASA, Manned Spacecraft Center, Flight Support Div., Houston, Tex.) and A. Ponder Paul (Philco-Ford Corp., WDL Div., Houston, Tex.).

IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07]
Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 342-347.

Description of the Apollo biomedical telemetry system by tracing each parameter from the sensors on the astronaut through various transformations (analog, sampled analog, digital pulse-code modulation, and FM multiplexed) to the aeromedical consoles in the Mission Control Center. Data originate in the spacecraft from each astronaut who wears a biomedical harness consisting of five electrodes. The electrodes provide a measurement of sternal and axillary electrocardiogram (ECG) and an impedance pneumogram (ZPG). One of the five electrodes serves as a ground or reference level, a separate pair provides sternal ECG measurement, and the other pair provides either or both axillary ECG and ZPG measurements. The electrodes are connected to the biomedical-signal conditioners which essentially amplify and filter the signals from a level of 0 to 1 mv to 0 to 5 v dc for ECG, and interpret changes in 50-kHz excitation voltage from 0 to 2.5 mv in terms of transthoracic impedance of 0 to 5 ohms to 0 to 5 v dc. M. G.

A68-27022 *

BIOENVIRONMENTAL MONITORING OF MANNED SPACE FLIGHT.

Kenneth N. Beers (NASA, Manned Spacecraft Center, Medical Requirements Office, Houston, Tex.) and William E. Thornton (NASA, Manned Spacecraft Center, Astronaut Office, Houston, Tex.).

IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07]
Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 348-354. 17 refs.

Discussion of the current state of the art of bioenvironmental monitoring, together with a review of the bioenvironmental monitoring techniques used in Project Mercury and the Gemini Program. For the Apollo Program, the parameters measured will be one EKG selected by an onboard switch from one of two crewmembers in the lunar module (LM), and one EKG from each extravehicular astronaut. All command-module data will be transmitted pulse-code-modulated by unified S-band communications link. LM physiological data will be transmitted frequency-modulated by unified S-band communications link. An interdisciplinary team approach is suggested in design, development, implementation, and evaluation of man-related spacecraft systems of the future. M. G.

A68-27023 #

THE DESIGN OF A PERSONAL TELEMETRY SYSTEM FOR USE IN AN ORBITING LABORATORY.

Gillig L. Fromme, Robert M. Adams (USAF, Systems Command, Aerospace Medical Div., School of Aerospace Medicine, Biomedical Engineering Branch, Brooks AFB, Tex.), and Howard A. Vick (Northrop Corp., Northrop Nortronics Div., Northrop Systems Laboratories, Hawthorne, Calif.).

IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07]
Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 355-360. 13 refs.

Description of a prototype pulse-position-modulation telemetry system which was found to provide excellent results. The transmitter input has an impedance of over a 1000 megohms measured at a frequency of 50 Hz. The common-mode rejection ratio of the ECG amplifier is 100 db. The SNR and the cross-talk of the total telemetry system exceed 35 db over a frequency range of 0.1 to 50 Hz. Signals can be received over a range of more than 100 ft, using a simple receiving antenna. The receiver has an input sensitivity of 0.5 μv for a 6-db signal/signal-plus-noise ratio. It also has a 400:1 image rejection ratio, 80 db of automatic gain control, and an i.f. bandwidth of 10 kHz. The merits of the device include: low average

power consumption and hence long operating life, high reliability and operational stability through the use of crystal-controlled transmitters and receivers, and small transmitter package size.
V. P.

A68-27024
INTEGRATION OF EEG TELEMETRY AND CLOSED CIRCUIT TV IN BEHAVIORAL NEUROPHYSIOLOGY.
Robert P. Caruthers (Kentucky, University, Dept. of Psychiatry, Laboratories of Behavioral Neurophysiology, Lexington, Ky.).
IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07] Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 361-367.

Description of a laboratory built for combined researches on behavior and neurophysiology. Projects attempting to correlate brain electrical events with behavioral developments during problem-solving utilized telemetry of electroencephalograms combined with video recordings of performance. It is pointed out that, whereas film techniques were chosen over video recording in the original planning of the experiments, the technology of tape has advanced to the point where a tape system is now recommended to monitor behavior.
M. F.

A68-27025
TELEMETRY STUDIES OF SLEEP IN THE UNRESTRAINED CHIMPANZEE.
James J. McNew (California, University, Brain Research Institute, Space Biology Laboratory, Dept. of Anatomy, Los Angeles, Calif.), Raymond T. Kado, John R. Zweizig, W. Ross Adey (California, University, Brain Research Institute, Space Biology Laboratory, Los Angeles, Calif.), and Richard C. Howe.
IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07] Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 374-380. 11 refs.

Use of a biotelemeter to study the various phases of sleep in the chimpanzee, using data from cortical and subcortical brain electrodes as well as the electrooculograph (EOG) and the electromyograph (EMG). Previous studies have been conducted under abnormal conditions which appear to influence markedly the sleep-wakefulness cycles and, in particular, the rapid eye movement (REM) phases. For the evaluation of the sleep patterns in the chimpanzee, six categories were used: awake, drowsy, light sleep, medium sleep, deep sleep, and REM. It is found that EMG serves as a poor criterion to differentiate REM from non-REM sleep. This finding is in agreement with the earlier chimpanzee studies of Rickles (1965) and Bert et al. (1968).
M. F.

A68-27026 *
A SIMPLE PULSED TRANSMITTER FOR TELEMETERING BODY TEMPERATURE FROM FREE RANGING ANIMALS.
H. W. Shirer (Kansas, University, Dept. of Electrical Engineering and Dept. of Biochemistry and Physiology, Lawrence, Kan.), J. D. Pauley, and D. D. Pippitt.
IN: NTC 68; NATIONAL TELEMETERING CONFERENCE, HOUSTON, TEX., APRIL 8-11, 1968, RECORD. [A68-26978 12-07] Conference sponsored by the Aerospace and Electronic Systems Group and the Communication Technology Group of the Institute of Electrical and Electronics Engineers.
New York, Lewis Winner, 1968, p. 386-390. 14 refs.
NASA-supported research.

Development of an inexpensive, small, pulse-modulated, crystal-controlled transmitter to measure body temperature in free ranging animals. The transmitter is surgically implantable and powered by a mercury cell of one to four months life using 250 or 1000 ma-hr batteries. The theory of operation, construction procedure, and performance of the transmitter are described.
M. F.

A68-27183 #
CHANGES IN THE NATURE OF THE RADIATION SHIELDING EFFECT OF PROPYL GALLATE DURING PROTON BOMBARDMENT OF POTATOES [IZMENENIE KHARAKTERA RADIOZASHCHITNOGO DEISTVIIA PROPILGALLATA PRI OBLUCHENII KARTOFELIA PROTONAMI].
Iu. I. Shaidorov, D. F. Gertsuskii, I. S. Skukina, I. V. Nikitina, and L. V. Alekseenko.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 18-21. 9 refs. In Russian.

Investigation of the protective effect of propyl gallate (propyl ester of gallic acid) on the growth and development of potato tuber eyes exposed to bombardment with 660-Mev protons from a cyclotron and to irradiation with doses of 500, 1000, and 3000 rad of gamma rays from a Co^{60} source. Tuber eyes soaked with 0.1% propyl gallate solution for 20 hr produced a higher tuber yield than unsoaked control samples, after gamma bombardment. On the other hand, a negative effect of gallic acid on growth and development was apparent in proton-bombarded samples.
V. Z.

A68-27184 #
WEIGHT OF THE BODY AND PROTEIN SYNTHESIS IN ANIMALS DURING HYPOKINESIA [VES TELA I SINTEZ BELKOV U ZHIVOTNYKH PRI GIPOKINEZII].
I. V. Fedorov, Iu. I. Milov, V. N. Vinogradov, and L. A. Grishanina.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 22-24. 13 refs. In Russian.

Investigation of the effect of 2- and 15-day hypokinesia on the weight of the bodies and certain organs, the glycogen content in the liver, the total nitrogen content and tissue proteolysis of the skeletal muscles in a group of 217 white male rats. A substantial decrease in the absolute weight, with an increase in the relative weight, is established for the liver, the right kidney, the heart, the testicles, and the skeletal muscles of the hind legs of experimental rats. A sharp decrease in the glycogen content of the liver is also noted.
V. Z.

A68-27185 #
EFFECT OF PROLONGED HYPOKINESIA ON THE HIGH-ALTITUDE ENDURANCE OF WHITE RATS [VLIIANIE DLITEL'NOI GIPOKINEZII NA VYSOTNUIU USTOICHIVOST' BELYKH KRYS].
N. A. Agadzhanian and G. V. Machinskii.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 25-28. 13 refs. In Russian.

Investigation of the effect of 10- and 25-day hypokinesia on the resistance of white rats to simulated high-altitude conditions. In pressure-chamber experiments, the occurrence of convulsions is established at a pressure corresponding to an altitude of 12,950 m in both control rats and experimental rats subjected to 10-day hypokinesia. In rats subjected to 25-day hypokinesia, on the other hand, convulsions began to occur at a simulated altitude as low as 2530 m.
V. Z.

A68-27186 #
EFFECT OF TRANSVERSE ACCELERATION ON THE NEUROSECRETORY FUNCTION OF THE NUCLEI OF THE FRONTAL HYPOTHALAMUS [O DEISTVII POPERECHNO NAPRAVLENNOGO USKORENIIA NA NEIROSEKRETORNUIU FUNKTSIIU IADER PEREDNEGO GIPOTALAMUSA].
L. A. Andrianova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 28-32. 14 refs. In Russian.

Study of the neurosecretory function of the nuclei of the frontal hypothalamus in a group of 36 male rabbits which underwent transverse accelerations 15 to 20 min, 3 hr, 1 day, and 3 days previously. Lower amounts of secretion in the neurons of the nuclei and a higher antidiuretic activity of the blood plasma are established in experimental rabbits 15 min following the exposure to transverse acceleration.
V. Z.

A68-27187 #
MAINTENANCE OF THE STABILITY OF THE ORGANISM UNDER COMPLEX EXPERIMENTAL CONDITIONS BY PHYSICAL ACTIVITY [PODDERZHANIE USTOICHIVOSTI ORGANIZMA SREDSTVAMI DVIGATEL'NOGO REZHIMA V SLOZHNYKH EKSPERIMENTAL'NYKH USLOVIIAKH].
A. V. Korobkov, S. G. Zharov, A. A. Korobova, and L. A. Ioffe.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 32-37. 13 refs. In Russian.

Observation of the vital activity of a group of 8 male subjects confined in a pressure chamber for 16 days at a simulated altitude of 8000 m, or for 30 days at simulated altitudes of 7000 or 10,000 m in a pure oxygen medium. The functional condition of the cardiovascular, respiratory, and motor systems showed no substantial changes after experiments during which the men performed various physical activity according to a specially designed program. V.Z.

A68-27188 #
NORMALIZATION OF PHYSIOLOGICAL FUNCTIONS UNDER CONDITIONS OF HYPOKINESIA BY A METHOD OF COMPENSATING THE MUSCULAR ACTIVITY DEFICIT [K VOPROSU O NORMALIZATSII FIZIOLOGICHESKIKH FUNKTSII V USLOVIIAKH GIPOKINEZII METODOM VOSPOLNENIIA DEFITSITA MYSHECHNOI AKTIVNOSTI].
M. A. Cherepakhin.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 37-42. 13 refs. In Russian.

Description of experiments in which a group of 6 healthy male subjects confined to 62-day bed rest, performed daily 2.5-hr physical exercises by stretching rubber braids in various prone positions in an attempt to make up for the absence of normal muscular activity. The positive effect of these exercises on the resistance to orthostatic and dynamic loads, on the muscular system of the brachial girdle, on the acceleration endurance, and on the immunological properties of the organism is noted. V.Z.

A68-27189 #
ENDURANCE OF MAN UNDER PHYSICAL STRESSES DURING FOUR MONTHS OF ISOLATION IN A CLOSED SPACE [PERENOSIMOST' FIZICHESKIKH NAPRIAZHENII VO VREMIA 4-MESIACHNOI IZOLIATSII CHELOVEKA V ZAMKNUTOM PROSTRANSTVE].
L. R. Iseev and Iu. G. Nefedov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 42-46. In Russian.

Observation of the functional performance of a group of five healthy male subjects, 19 to 32 years old, confined in an airtight chamber for a test period of four months, during which the subject daily performed 5-min cycles of alternating light-, medium-, and high-load veloergometric exercises according to a prescribed program. Changes in the function of the respiratory and cardiovascular systems and in the biopotentials of the brain indicate a state of impairment of functional capacity developed by these men as the test progressed. V.Z.

A68-27190 #
FUNCTION OF THE OTOLITH APPARATUS UNDER CONDITIONS OF WEIGHTLESSNESS DURING AN AIRCRAFT FLIGHT [FUNKTSIIA OTOLITOVOGO APPARATA V USLOVIIAKH NEVESOMOSTI PRI POLETE NA SAMOLETE].
A. I. Gorshkov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 46-49. In Russian.

Laboratory investigation, under conditions of simulated weightlessness, of the response threshold of the otolith apparatus, defined as the minimum value of linear acceleration which produces a sensation of motion in a blindfolded person. Higher g values for the threshold are established during brief periods of simulated weightlessness in every one of a total of 195 tests on a group of 51 persons. Also higher were the g values during weightlessness for the galvanic current threshold, defined as the minimum current producing a banking sensation in blindfolded persons. V.Z.

A68-27191 #
VEGETATIVE DEVELOPMENTS DURING MOTION SICKNESS [O VEGETATIVNYKH IAVLENIIAKH PRI BOLEZNI DVIZHENIIA].
V. N. Barnatskii and A. G. Kuznetsov.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 49-53. 19 refs. In Russian.

Study of the motor activity of the stomach in a group of 12 dogs in a state of rest and during and after 60-min rotation and rocking. Stomach-implanted silver electrodes are used for measuring the biopotential of the stomach wall, the pyloric sphincter, and the associated neural ganglions. The passage of aqueous 0.1% $NaHCO_3$ and 0.5% HCl solutions from the stomach into the duodenum is observed by using fistulas. An inhibitive effect of motion on the motor activity of the stomach is established in dogs. V.Z.

A68-27192 #
THE HUMAN OPERATOR UNDER CONDITIONS OF ACCELERATION [CHELOVEK-OPERATOR V USLOVIIAKH DEISTVIIA USKORENII].
A. S. Barer, A. S. Eliseev, V. E. Panfilov, and S. A. Rodin.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 54-58. 19 refs. In Russian.

Investigation of the performance of human operators in manually handling the controls of cosmonaut/space vehicle systems under the effects of accelerations up to 18 g in a centrifuge. A statistically evident impairment of the efficiency of a group of tested male operators was observed at accelerations above 10 to 12 g. Nevertheless, the performance remained satisfactory throughout the entire tested g range. V.Z.

A68-27193 #
EFFECT OF ISOLATION AND SENSORY DEPRIVATION ON THE ORGANISM [VLIIANIE NA ORGANIZM IZOLIATSII I SENSORNOI DEPRIVATSII].
L. Shvab and Ia. Gross.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 58-62. 18 refs. In Russian.

Review of the various experiments performed by a number of investigators concerning the effect of social isolation on the human organism and the position of this social isolation among the other factors of sensory deprivation. Particular attention is given to the results obtained by Brownfield (1964), Davis et al. (1961), Freedman and Greenblatt (1960), Hebb (1949), Heron et al. (1953), Kubzanski (1961), Lilly (1956), and Shurley (1960). V.P.

A68-27194 #
MECHANISMS OF INFLIGHT SPATIAL ORIENTATION AND SOME FACTORS IMPAIRING IT [O MEKHANIZMAKH PROSTRANSTVENNOI ORIENTIROVKI V POLETE I NEKOTORYKH PRICHINAKH EE NARUSHENIIA].
B. S. Aliakrinskii and S. I. Stepanova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 63-68. 14 refs. In Russian.

Analysis showing that the perception of man in space is a function of complex nervous relationships involving optic, kinesthetic, vestibular, and other analysors. During flight on board a high-speed vehicle, the system of intermodal associations, involving analysors, forms a single afferent space-reflection system. This is accomplished by an integration of the individual subsystems responsible for the perception of the position of the body in the cabin relative to the force field of the vehicle, the perception of the posture, and the attitude of the vehicle in space. A major cause impairing the functioning of the system is the decompensation of a unilateral pathological state of the vestibular apparatus in response to various negative flight effects. This effect is accompanied by hallucinations, motor discoordination, and instability and lability of the myogenic tonus. V.P.

A68-27195 =
RADIOBIOLOGICAL DATA CONCERNING LOCAL SHIELDING OF ASTRONAUTS [RADIOBIOLOGICHESKIE DANNYE K OBOSNOVANIIU LOKAL'NOI ZASHCHITY KOSMONAVTA].
Iu. G. Grigor'ev, G. F. Nevskaia, G. M. Abramova, E. V. Ginsburg, and M. P. Kalandarova.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 68-72. 14 refs. In Russian.

Experimental investigation of the effectiveness of local shielding against 250-Mev proton irradiation at a minimum absolutely lethal dose. The experiments were performed with dogs, using paraffin blocks to shield the head and stomach. The shielded areas constituted one-seventh of the entire body. The criteria employed in the evaluation of shielding effectiveness were: the survival rate, the level of radiation sickness, the immunobiological reactivity (skin bacterial properties in relation to E. coli and dynamics of indigenous microflora changes), and peripheral-blood and bone-marrow measurements. The control animals exposed to total irradiation all perished from acute radiation sickness after an average of 14.5 days after irradiation. All animals to whom local shielding was applied survived, head shielding being found to be substantially more effective than stomach shielding. Dogs with head shielding showed practically no symptoms of radiation sickness, whereas stomach shielding alone was accompanied by pronounced radiation-sickness symptoms, recovery beginning only after a period of at least four weeks. A discussion of protection mechanisms of shielded portions of the body, particularly the head, reveals the important role of the bone marrow. V.P.

A68-27196 #
THERMAL-STRESS DYNAMICS AND HUMAN THERMAL-LOAD ENDURANCE LIMITS [O DINAMIKE TEPLOVOGO NAPRIAZHENIIA I PREDELAKH PERENOSIMOSTI CHELOVEKOM TEPLOVOI NAGRUZKI].
S. M. Gorodinskii, G. V. Vavro, E. M. Perfilova, Iu. G. Pletenskii, and S. G. Salivon.
Kosmicheskaia Biologiia i Meditsina, vol. 2, Jan.-Feb. 1968, p. 73-81. 25 refs. In Russian.

Experimental investigation of the mental and physical performance characteristics of man under thermal loads. The results indicate that the admissible rectal temperature lies between 37.6 and 37.8°C, with an admissible threshold of 38.6 to 38.9°C. The threshold heat content of the human organism is 31.8 kcal/kg. It is shown that it is more rational to measure the permissible heat content of the organism rather than the admissible heat accumulation when comparing data on human tolerance to heat stress. V.P.

A68-27306
VENTILATORY OXYGEN DRIVE IN ACUTE AND CHRONIC HYPOXIA.
R. Lefrançois, H. Gautier, and P. Pasquis (Rouen, Université, Laboratoire de Physiologie, Rouen, France).
Respiration Physiology, vol. 4, Mar. 1968, p. 217-228. 28 refs.

Investigation of ventilatory oxygen drive in four groups of subjects by measuring the transient changes of ventilation occurring after inhalation of two or three breaths of pure oxygen or nitrogen. The four groups consisted of: (1) acutely hypoxic normal subjects; (2) lowlanders acclimatized to 3660 and 5200 m; (3) highlanders native to the same altitudes; and (4) highlanders apparently affected by chronic altitude sickness. Ventilatory oxygen drive was strong in groups one and two, slight in native highlanders, and nonexistent in the patients. Alveolar gases were analyzed at four altitudes (2700, 3660, 4200, and 5200 m); at each, highlanders were significantly more hypoxic and hypercapnic than lowlanders acclimatized to the same altitude. A third curve for highland natives can be drawn on the O_2-CO_2 Rahn and Otis diagram and is explained by the weak ventilatory oxygen drive of highlanders. M.F.

A68-27307 *
RESPONSE OF THE PERFUSED CAROTID BODY TO CHANGES IN pH AND P_{CO_2}.
Barry A. Gray (Dartmouth College, Dartmouth Medical School, Dept. of Physiology, Hanover, N.H.).
(Wates Foundation Symposium on the Arterial Chemoreceptors, Oxford, England, July 1966.)
Respiration Physiology, vol. 4, Mar. 1968, p. 229-245. 29 refs. Research supported by the Life Insurance Medical Research Fund; NIH Grant No. HE-2888(08); Grant No. NsG(T)-128.

The carotid bifurcation of cats was perfused, in situ, at constant pressures with bicarbonate buffered Ringer's solution. The response of the chemoreceptors to abrupt changes in pH and/or P_{CO_2} was measured as the change in impulse frequency recorded from Hering's nerve. The responses to equal pH changes produced, either by a decrease in HCO_3^- concentration, or by an increase in P_{CO_2}, were of equal magnitude, but the response developed more rapidly when the P_{CO_2} was changed. An increase in P_{CO_2} at constant pH did not produce a sustained response. However, there was usually a transient increase in impulse frequency, lasting 20 to 50 sec. These observations suggest that the acid-base responses of the carotid body are mediated by a H ion receptor whose activity is uniquely determined by extracellular pH, and that the receptor is separated from the vascular space by a diffusion barrier less permeable to HCO_3^- than to CO_2. A possible mechanism for chemoreceptor adaptation to changes in arterial P_{CO_2} is discussed. (Author)

A68-27308 #
HUMAN LOCOMOTION ON THE LUNAR SURFACE.
R. Margaria and G. A. Cavagna (Milano, Università, Istituto di Fisiologia Umana, Milan, Italy).
(Pan-American Congress on Sports Medicine, 5th, Winnipeg, Canada, July 24, 25, 1967.)
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 629-644. 8 refs.
Research supported by the Consiglio Nazionale delle Ricerche.

Discussion of the vital changes in the components of locomotion mechanisms which take place under conditions of lunar gravity at G = 1/6, both as time ratios and energy. It is pointed out that the decrease in body weight brings about a decrease in the generated kinetic energy and, at the same time, the prevalence of the vertical component. This results in a decrease of the optimum attainable speeds in both walking and running. In subgravity, however, the more suitable method of locomotion is expected to be by successive leaps. In any case, the energy demanded for locomotion will be higher than that expected because of the gravity decrease. The contribution from elastic muscular energy will be greatly decreased by sizable changes in the time ratios of the various stages of muscular activity. M.M.

A68-27309 #
PATTERN OF PULMONARY VENTILATION AND ALVEOLAR GAS TENSION IN ATHLETES BEFORE, DURING, AND AFTER FIVE WEEKS OF STAY AT AN ALTITUDE OF 2250 METERS [ANDAMENTO DELLA VENTILAZIONE POLMONARE E DELLA TENSIONE DEI GAS ALVEOLARI IN ATLETI PRIMA, DURANTE E DOPO CINQUE SETTIMANE DI PERMANENZA ALL'ALTITUDINE DI 2250 M.].
A. Scano and G. Meineri (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
(NATO-AGARD, Aerospace Medical Panel Meeting, 24th, Brussels, Belgium, Oct. 24-27, 1967.)
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 645-662. 23 refs. In Italian.

Discussion of a literature survey which has pointed out that, according to most authors, it is possible to achieve satisfactory adaptation, although not a true acclimatization, through a more or less prolonged and uninterrupted stay at altitude. The actual significance of this phenomenon, rather than its limitations, was investigated. The phenomenon was studied through a longitudinal analysis of some respiratory parameters of obvious significance in athletes who stayed from three to five weeks in Mexico City at 2250 m above sea level. The average values calculated from six-day periods did not show any significant changes as compared with the average values calculated from the entire acclimatization period. The values obtained differ significantly from those observed at a simulated altitude of 2500 m. This fact indicates a condition of adaptation, which is comparatively more significant and stable relative to the same values found at simulated altitude. M.M.

A68-27310 #
ELECTRONYSTAGMOGRAPHIC INVESTIGATION DURING THE PURKINJE PHENOMENON [RICERCA ELETTRONISTAGMOGRAFICA DURANTE IL FENOMENO DI PURKINJE].
R. Caporale and G. Mazza (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale; Istituto Medico-Legale per l'Aeronautica Militare, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 663-680. 11 refs. In Italian.

Clarification of some particular aspects of the manifestations and mechanism of the Purkinje phenomenon, starting from the knowledge that the change in the gravitational and inertial vector would attenuate the sensorial and nystagmic responses of vestibular origin. The sensorial and nystagmic phenomena observed in a group of young subjects, skilled in aerobatic flying, due to changes in the spatial orientation of the semicircular canals in a phase subsequent to rotatory stimulation, were studied by means of a rotatory Toennies chair and an electronystagmograph. The results showed that: (1) the characteristics of rotatory sensation can be correlated with the ones of rotatory stimulation and head-position changes in space; (2) the qualitative characteristics of nystagmus do not show any changes; and (3) the quantitative characteristics of nystagmus undergo attenuation, according to Benson and Bodin. M.M.

A68-27311 #
OCCLUSIONAL X-RAY EXAMINATION OF THE MASTICATORY SYSTEM FOR PERSONAL IDENTIFICATION [L'ESAME RADIOLOGICO OCCLUSALE DELL'APPARATO MASTICATORIO NELLA IDENTIFICAZIONE PERSONALE].
G. Paolucci and G. Venditti (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale; Infermeria A.M., Rome, Italy).
(Congresso Internazionale di Medicina Aeronautica e Spaziale, 16th, Lisbon, Portugal, Sept. 11-15, 1967.)
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 681-692. 10 refs. In Italian.

Description of a method for personal identification in air crashes. This method offers the possibility of obtaining reliable data of a strictly personal character. These data are easily and quickly processed at a small cost. The method consists in the occlusional X-ray examination of the masticatory system. Photographs of X-ray films taken on several subjects are shown to demonstrate the validity of the method. M.M.

A68-27312 #
CHECK OF OXYGEN PURITY FOR ONBOARD RESPIRATORS BY MEANS OF IR ABSORPTION SPECTROPHOTOMETRY [CONTROLLO DELLA PUREZZA DELL'OSSIGENO PER RESPIRATORI DI BORDO CON LA SPETTROFOTOMETRIA DI ASSORBIMENTO NELL'INFRAROSSO].
C. Marangoni, A. Giusti, and E. Di Carlo (Aeronautica Militare, Laboratori, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 693-703. In Italian.

Description of a method for metering the carbon tetrachloride and trichloroethylene that may be present in the liquid oxygen of onboard respirators by means of IR spectrophotometry. This method allows the metering of these two compounds to meet the requirements of specification MIL-O-27210-A, as well as those of the Italian Air Force Specification AM-M-532. M.M.

A68-27313 #
CHANGES IN THE PHYSIOLOGICAL RESPIRATORY AND CARDIOCIRCULATORY PARAMETERS IN EXPERIENCED PILOTS SUBJECTED TO FUNCTIONAL TESTS REPEATED IN TIME [MODIFICAZIONI DI PARAMETRI FISIOLOGICI RESPIRATORI E CARDIOCIRCOLATORI IN PILOTI ESPERTI, SOTTOPOSTI A PROVE FUNZIONALI RIPETUTE A DISTANZA DI TEMPO].
G. Janigro (Aeronautica Militare, Centro di Studi e Ricerche di Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 704-717. 17 refs. In Italian.

Study of the results of functional tests carried out in two successive examinations of flying personnel aged 24 to 47. The aim of the study was to point out possible changes in the respiratory and cardiocirculatory functional responses of healthy subjects caused by flight accidents in high-performance aircraft (F 104 Starfighters). The study was extended to a third control examination in a smaller group of subjects. In the second test, only minor changes were found, such as a slight decrease in vital capacity, slight increases in oxygen intake, and in the Cal/l and V_{O_2}/heart rate ratios during muscular exercise. The pulmonary ventilation and heart rate values decreased in the anoxic anoxia test. These changes are too minor and statistically insignificant to demonstrate changes in the respiratory and cardiocirculatory functional efficiency. They can be related to familiarization of the subjects with the test, thus eliminating emotional factors that might have somehow affected the results of the first test. The absence of sizable changes was confirmed by the data obtained in subjects who took the test for three years. This fact confirms that flight activity, even if intense and stressing, will not limit the cardiorespiratory efficiency of pilots. M.M.

A68-27314 #
PRESENT STATE OF KNOWLEDGE CONCERNING THE EFFECTS OF RADAR WAVES ON LIVING ORGANISMS AND RELATIVE PROTECTIVE DEVICES. II [NOZIONI ATTUALI CIRCA GLI EFFETTI DELLE ONDE RADAR SUGLI ORGANISMI VIVENTI ED I RELATIVI MEZZI DI PROTEZIONE. II].
R. Busco and L. Comignani (Roma, Università, Scuola di Specializzazione in Medicina Aeronautica e Spaziale, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 718-757. 169 refs. In Italian.

Brief description of the principal physical characteristics of vhf electromagnetic waves, mainly radar waves, following a short discussion of radar operating principles. The physiological and pathological activity of electromagnetic waves, both from the physicochemical and biological standpoints, are examined. It is noted that recent observations show a general specific biological effect as well as a nonspecific thermogenetic effect which cannot be exactly defined and which affect the human neurovegetative system. The brain and the spinal cord, as well as the eyes and the sex glands, are the most sensitive organs. All the reports of significant damage to human organs involve subjects accidentally exposed to very high radiative energy. Protective measures and devices used to protect radar operators from microwaves and from the effects associated with them are discussed. M.M.

A68-27315 #
CLOTHING HYGIENE WITH PARTICULAR REFERENCE TO AEROSPACE PROBLEMS. IV [L'IGIENE DEL VESTIARIO CON PARTICOLARE RIFERIMENTO AI PROBLEMI AEROSPAZIALI. IV].
E. Sulli (Roma, Università, Istituto di Igiene; Aeronautica Militare, Ispettorato Logistico, Servizio Sanità, Rome, Italy).
Rivista di Medicina Aeronautica e Spaziale, vol. 30, Oct.-Dec. 1967, p. 759-841. 84 refs. In Italian.

Discussion of clothing with respect to flying conditions, which has always been a major problem of aeronautical physiology. It is noted that, with the rapid growth of aircraft, and particularly with the growth of space exploration, the choice of flight suits, which in the beginning was based on the protection to be afforded to the pilot against heat stress, acceleration, decompression sickness, etc., has at present acquired a particular character represented by the necessity of affording hygienic comfort. The discussion deals mainly with specific garments and personal equipment. These are necessary for ensuring the astronaut not only the protective safeguards mentioned above, but also an individual microclimate. Its essential factors, refined to a degree of optimal acceptability, will allow the survival and functionality of man in space outside of the protection afforded by the space vehicle itself. M.M.

A68-27489 *
CELL-LIKE STRUCTURES FROM SIMPLE MOLECULES UNDER SIMULATED PRIMITIVE EARTH CONDITIONS.

A. E. Smith, J. J. Silver, and G. Steinman (Sir George Williams University, Physics Dept., Montreal, Canada; Pennsylvania State University, Biochemistry Dept., University Park, Pa.).
Experientia, vol. 24, Jan. 15, 1968, p. 36-38. 15 refs.
National Research Council of Canada Grant No. A-2528; Grant No. NGR-39-009-015.

Experimental demonstration of how simple compounds likely to have been on the primitive earth can lead to the formation of cell-like structures which could have served as matrices for subsequent stages of biogenetic evolution. The spheres, capable of interacting with the environment (since they absorb dyes, exude vacuoles, and incorporate smaller spheres) are thus possible precursors to a higher level of organization. However, no suggestion is made that these spherules are in fact alive. Rather, the experiments demonstrate one means whereby a delimited, localized environment could have arisen bearing a number of the characteristics from which a biodynamic system might evolve. M. M.

A68-27532 *
ALIMENTARY RESPONSES TO FOREBRAIN STIMULATION IN MONKEYS.
Bryan W. Robinson (National Institute of Mental Health, Bethesda, Md., Emory University, Yerkes Regional Primate Research Center, Atlanta, Ga.) and Mortimer Mishkin (National Institute of Mental Health, Bethesda, Md.).
Experimental Brain Research, vol. 4, 1968, p. 330-366. 141 refs.
NIH Grant No. FR-00165; Grant No. NGR-11-001-012.

Account of an experimental investigation in which the electrical stimulation of 5885 loci in the forebrains of 15 male rhesus monkeys elicited the alimentary responses of food intake, water intake, food ejection, and vomiting. Intake of nonfood objects was also recorded. The following results were obtained. Food intake was evoked from the preoptic region, substantia innominata, lateral, dorsal and posterior hypothalamus, tegmentum, medial hypothalamus, midline thalamus, central gray, anterior internal capsule, putamen, and stria terminalis. Nonfood intake was evoked from most of these structures and, additionally, from the anterior cingulate region. Water intake was elicited from the anterior cingulate region, anterior internal capsule, putamen, substantia innominata, lateral, dorsal and posterior hypothalamus, tegmentum, substantia nigra and medial hypothalamus. Food ejection and vomiting were obtained from the preoptic region and medial hypothalamus, olfactory tubercle, amygdala, septum, fornix, and nucleus ventralis anterior. Quantitative measures of response probability, response distribution and threshold, as well as behavioral analysis indicated that no simple anatomical or behavioral scheme could satisfactorily organize these data. Alimentary mechanisms appear to be diverse, nonunitary, and complex. M. M.

A68-27554 *
THE RENAL LYMPHATICS - AN ACTIVE FLUID TRANSPORT SYSTEM.
A. T. K. Cockett.
IN: PROGRESS IN LYMPHOLOGY; PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON LYMPHOLOGY, ZURICH, SWITZERLAND, JULY 19-23, 1966.
Edited by A. Rüttimann.
Stuttgart, Georg Thieme Verlag, 1967, p. 180-182.
NIH Grant No. HE-09834-02; Grants No. NsG-237-62; No. NsG-05-007-003.

Determination of the enzymes and hormonal concentrations in renal lymph fluid, of antibiotic concentrations within the renal interstitium (renal lymph) and measurement of respiratory gases within renal lymph fluid. Renin-angiotensin levels on an equal volume basis are found in higher concentrations in the renal lymph, and oxygen tension in it is seen to be less than the corresponding arterial levels. B.B.

A68-27586 *
MOLECULAR PARAMETERS IN BRAIN FUNCTION.
Francis O. Schmitt (Massachusetts Institute of Technology, Cambridge, Mass.).
IN: THE HUMAN MIND.
Amsterdam, North-Holland Publishing Co., 1967, p. 111-138. 82 refs.
Research supported by the Rogosin Foundation and the Louis and Eugenie Marron Foundation; NIH Grants No. NB-00024-18; No. GM-10211-05; Grants No. NsG-462-3; No. NsG-22-009-018; No. Nonr(G)-00034-66; Contract No. Nonr-1841.

Outline of some of the recent conceptual contributions of molecular science, chiefly biophysics and biochemistry, to brain science. Certain concepts of brain functions derived from classical neurosciences are discussed, and such neurophysiological concepts as functional plasticity, field, and simultaneity are considered. Concepts emerging from biophysical and biochemical evidence are evaluated. B.B.

A68-27812 #
COLORIMETRIC PERSONAL DOSIMETER FOR HYDRAZINE FUEL HANDLERS.
Charles A. Plantz, Paul W. McConnaughey, and Cecelia C. Jenca (Mine Safety Appliances Co., Pittsburgh, Pa.).
(American Industrial Hygiene Conference, Chicago, Ill., May 1-5, 1967.)
American Industrial Hygiene Association Journal, vol. 29, Mar.-Apr. 1968, p. 162-164. 10 refs.
Contract No. AF 33(615)-2929.

A dosimeter badge has been developed to detect vapors of hydrazine, unsymmetrical dimethylhydrazine (UDMH), and monomethylhydrazine (MMH). On exposure to the vapors the sensitive material contained in the badge develops a color whose intensity is approximately proportional to the integrated concentration-time value to which the badge has been exposed. Color standards are on the badge, so that the color and therefore the concentration times the time of exposure can be estimated by fuel handlers. The colorimetric substance is bindone, [Δ1.2'-biindan]-1',3,3'-trione, impregnated on thin-layer chromatography material. (Author)

A68-27816 #
AN INVESTIGATION OF RISK-ACCEPTANCE AND PILOT PERFORMANCE DURING LOW ALTITUDE FLIGHT.
John B. Galipault (Galipault and Associates).
Society of Experimental Test Pilots, Technical Review, vol. 9, no. 1, 1968, p. 20-38.

Investigation of the effects of aircraft approach airspeed and opening between obstacles in very-low altitude flying on the mean clearance error of the aircraft's wing and level of risk acceptance. The results showed that airspeed in the approach was not a factor in the determination of mean clearance error of the aircraft going between the obstacles. It was found that the opening between obstacles was significantly related to the mean clearance error. M.G.

A68-27823 *
BIO-MEDICAL TELEMETRY: SENSING AND TRANSMITTING BIOLOGICAL INFORMATION FROM ANIMALS AND MAN.
R. S. Mackay (California, University, Berkeley, Calif.; Boston University, School of Medicine, Boston, Mass.).
Research supported by the University of California and NASA, Grant No. NsG-600.
New York, John Wiley and Sons, Inc., 1968. 397 p. $12.50.

The text examines the possibilities and limitations of biomedical telemetering methods. Some of the potentialities, limitations, and ideas of biomedical telemetry are presented, and, along with a review of some of the electronic equipment used in telemetry research, may be regarded as background material in the present study. Modulation systems used in telemetry work are then briefly discussed. Plastics and other materials used in the construction of internal recording devices are examined with respect to body fluid permeability, electric loss, dielectric constant, and tissue and blood reactions. The use of the transducer in the observation of internal pressure and acceleration changes is investigated, and different types of sensors and transmitters used for other variables are presented. Frequency and antenna selection are considered, with emphasis on loop and other dipole antennas, directional antennas

and omnidirectional systems. The area of calibration and response control is also discussed. Special attention is given to the manner in which the telemetry methods are applied to aquatic animals. Additional factors involved in the choice of antenna turns and frequencies are briefly considered in the appendices. R.B.S.

A68-27866 *
BIOLOGIC RHYTHMS IN THE BODY.
Richard J. Wurtman (Massachusetts Institute of Technology, Cambridge, Mass.).
Technology Review, vol. 70, Mar. 1968, p. 23-27.
PHS Grant No. AM-11709; Grant No. NGR-22-009-272.
Discussion of the physiological significance of biological rhythms in the human body. The production of biological rhythms is discussed and the physiological aspects of metabolic rhythms are considered. It is seen that concentration of tyrosine in the blood of humans fluctuates in those on protein-free diets in the same way as in those consuming protein in their food. B.B.

A68-27897
RESPIRATORY EFFECTS OF STRESS DURING EJECTOR SEAT OPERATIONS.
L. R. C. Haward (Graylingwell Hospital, Chichester, Sussex, England).
Flight Safety, vol. 1, no. 4, 1968, p. 8-14. 7 refs.
Discussion of the results of experimental investigations of the respiratory effects of stress during ejection-seat operations. The technique adopted for recording physiological variables makes use of an oscillator circuit for each variable, the oscillator frequency being varied by changes in the electrical parameters of the sensing element - e.g., the electrical resistance of the skin in the PGR (psychogalvanic response) circuit. It is noted that one point of importance which has emerged from these respiratory studies of stress is that individuals most subject to impairment of motor activities during stress are those with the highest stress response - namely, the dysthymic group, and that this contradicts a commonly held belief that it is the hysteric who is most prone to "freezing." Whether this form of behavior is generalized or specific to the particular situation remains to be investigated. M.M.

A68-27898
AERONAUTICAL ANXIETY.
R. Gelly (Armée de l'Air, Paris, France).
Flight Safety, vol. 1, no. 4, 1968, p. 24-26.
Theoretical considerations on aeronautical anxiety. It is pointed out that, in spite of their speculative aspect, these theoretical considerations warrant some practical conclusions. It is believed that account should be taken of the subject's ability to control the specific form of anxiety which has been called aeronautical anxiety, as this aptitude for anxiety-control determines in a way the success of pilot training and the adaptation during the subsequent career. The difficulties of this task are immense, because it is impossible to anticipate and to know exactly how the candidate will react in the face of aeronautical reality. It is pointed out that the contribution of clinical psychology might be most important in the field of mental hygiene of pilots. In fact, the states of disadaptation discussed are dangerous, not only for the pilot's health, but also for flying safety. Thus it is desirable to assess such conditions and stop them before they generate possibly fatal consequences. M.M.

LC ENTRIES

A68-80992
THE OXYGEN LUMINOMETER. AN APPARATUS TO DETERMINE SMALL AMOUNTS OF OXYGEN, AND APPLICATION TO PHOTOSYNTHESIS.
A. Burr and D. Mauzerall (Rockefeller U., New York, N. Y.).
Biochimica et Biophysica Acta, vol. 153, Apr. 2, 1968, p. 614–624. 30 refs.
Grant PHS GM 04922

A new method to determine oxygen based on the chemiluminescent reaction of oxygen and luminol dianion is described. The oxygen luminometer is a sensitive device for the continuous measurement of small amounts of oxygen. An inert carrier gas flows at a controlled rate through an electrolysis cell, then through a sample cuvette, and finally into a solution of luminol dianion in dimethyl sulfoxide. The light generated by the chemiluminescent reaction of the luminol dianion with the oxygen is measured with a photomultiplier. Calibration, either internally with the water electrolysis cell or externally with premixed gases, shows the response of the system to be linear over a range of greater than four orders of magnitude in oxygen concentration. The sensitivity corresponds to a rate of oxygen production of 10^{-13} mole/sec. or to a change in oxygen concentration of 0.01 p.p.m. in the gas or of 10^{-11} M in water at room temperature. The device has a response time of about one min. and the output is a direct measure of the rate of oxygen production in absolute units. The oxygen luminometer is suitable for measuring oxygen production in photosynthetic systems. A mutant of *Chlorella* which requires light for chlorophyll synthesis is shown to lose its chlorophyll and its oxygen-producing activity in the dark by simple dilution on cell division.

A68-80993
ON LET MOVEMENT DURING RUNNING [UBER DIE BEINBEWEGUNG BEIM LAUF].
R. Weiss, W. Baumann, and H. Groh (Saarbrücken, Bürgerhosp., 2. Chir. Klin. Orthopäd., Abt., West Germany).
Zeitschrift für Biologie, vol. 115, Oct. 1967, p. 407–417. In German.

Leg movements of 100 m. runners were investigated using kinematographic methods. The results of the locomotion in the space of a rotation of the leg about the fixed hip joint were condensed onto graphs. The motion pattern, as well as the velocities and acceleration at the balls of the feet and the center of gravity of the leg were determined. The duration of a double pace was about 0.4 sec., and the contact phase of the foot with the floor was 0.06 sec. The angle range traversed by the ball of the foot was 102°. The maximum velocity attained was 12 m./sec. The acceleration at the balls of the feet was given at a maximum of 42 g. The center of gravity of the leg moved in an angle range of 99°; of that, 62° were in front of and 37° were behind a plumb line through the hip joint. The maximum velocity attained at the repulses was 6.6 m./sec. The maximum acceleration of the center of gravity of the leg at the repulse phase was 22 g. That corresponded to an accelerating power of about 310 kp.

A68-80994
INVESTIGATION OF THE INTERRUPTION OF PRIMARY MOTOR ACTIVITY [UNTERSUCHUNGEN UBER DIE UNTERBRECHUNG EINFACHER MOTORISCHER HANDLUNGEN].
Manfred Amelang (Marburg/Lahn, U., Inst. für Psychol., West Germany).
Zeitschrift für Experimentelle und angewandte Psychologie, vol. 14, no. 4, 1967, p. 545–569. 94 refs. In German.

The effect of interferences upon the characteristics of voluntary motor activity was studied. In line with previous results in the literature, the reaction time experiments showed particularly short latency times (and high incidence of error) for those reactions which were inhibited by a second signal immediately following the first one. As an explanation of these observations, a simple model of behavior control was put forth which is primarily based on conditions found in reaction experiments. Several hypotheses were derived from the model and experimentally examined.

A68-80995
THE EFFECT OF HYPNOTICALLY INDUCED FATIGUE ON REACTION TIME.
Charles Graham, Richard A. Olsen, Michael Parrish, and Herschel W. Leibowitz (Pa. State U., University Park).
Psychonomic Science, vol. 10, Feb. 25, 1968, p. 233–224.
Pa. State U. supported research.

As part of a program investigating the effects of attention on automobile driver performance, the use of hypnosis as a research tool was studied in relation to a reaction time task. Reaction time increased 57% as a result of the hypnotically induced "fatigue" state. Some restrictions are suggested in utilizing hypnosis as a research tool.

A68-80996
CHANGE IN JUDGMENT OF DIRECTION OF GAZE AFTER AUTOKINETIC PERCEPTION.
Michael J. DeSisto and Samuel C. McLaughlin (Tufts U., Medford, Mass.).
Psychonomic Science, vol. 10, Feb. 25, 1968, p. 221–222. 11 refs.
Contract DA MD-2714 and Grant NSF GB-4196; NASA supported research.

Subjects were allowed to perceive horizontal autokinesis for 30 sec. and then asked to look back to the starting point of the autokinetic (AK) target. All subjects made a large eye movement in the direction opposite to that of AK movement, indicating that after AK perception, a change in judgment of direction of gaze had occurred.

A68-80997
HYPERBARIC OXYGEN.
Herbert A. Saltzman (Duke U., Med. Center, Durham, N. C.).
Medical Clinics of North America, vol. 51, Sep. 1967, p. 1301–1314. 34 refs.
Grants PHS HE 07896, PHS HE 5662, and PHS HE 5663; Life Insurance Med. Res. Fund supported research.

This review has described the rationale for hyperbaric oxygen and the known biomedical responses. The serious and unsolved hazard of oxygen toxicity limits practical tolerated exposures to less than three atm. of oxygen pressure for uninterrupted periods of no more than five hr. As a result, therapy with hyperbaric oxygen at the present time seems most practical for clinical problems where brief, multiple exposures can offer a reasonable opportunity for clinical improvement. Major therapeutic successes have been observed for hyperbaric oxygen in the management of decompression sickness and air embolism, carbon monoxide poisoning and gas gangrene. Furthermore, patients with certain inoperable tumors respond better to radiotherapy when it is combined with this new therapeutic modality. An impressive good experience has been reported in palliative surgical management of congenital cyanotic heart disease in infants. Also, patients suffering from acute cerebral

ischemia, ischemic skin grafts and refractory chronic osteomyelitis have improved remarkably in some instances after treatment. The ultimate contribution of hyperbaric oxygen to the broad field of vascular surgery and in the management of coronary heart disease has not been evaluated adequately up to the present time. In the future, wider clinical application will require the physician to prevent the emergence of oxygen toxicity in patients so that the limits of this therapeutic modality can be explored adequately.

A68-80998
PULMONARY HYPOTHERMIA IN DOGS.

Bashir A. Zikria, Jose M. Ferrer, and James R. Malm (Bellevue Hosp., First (Columbia) Surg. Div., New York City, N. Y.).

Journal of Applied Physiology, vol. 24, May 1968, p. 707–710. 8 refs.

Grants NIH HE-5986, NIH HE-08163, and HRC U-1483.

The systemic and regional temperature effects of cold air introduced through an endotracheal tube was studied in 36 dogs. Pulmonary cooling was induced by cold air through an endotracheal tube with an automatic respirator. Intratracheal temperatures of +6.5°C to +19.9°C. were reached without damage to the respiratory tissues. Pulmonary arteriovenous, intracardiac, rectal, esophageal, and distal tracheal temperatures were measured. With pulmonary hypothermia there was a 60-fold increase in pulmonary arteriovenous temperature difference over the control state and a rectal temperature drop of 2.7°C. in 30 min. During cooling of the tracheobronchial tree, the lungs did not demonstrate any intrinsic compensatory mechanism to conserve heat. By these experiments the feasibility of another method of *in vivo* organ cooling was demonstrated.

A68-80999
A COMPARISON OF THE EFFECTS OF NICOTINE AND AMPHETAMINE ON DRL PERFORMANCE IN THE RAT.

Cathleen F. Morrison (Tobacco Res. Council Labs., Harrogate, Great Britain).

Psychopharmacologia, vol. 12, Jan. 16, 1968, p. 176–180. 6 refs.

Rats of three strains were trained to press a bar for water on a differential reinforcement of low rates 20 schedule of reinforcement. Nicotine and amphetamine increased response rates in most experiments but both drugs occasionally depressed responding. In two of the strains there was a tendency for individual animals to be affected similarly by the two drugs.

A68-81000
THE STEADY-STATE DISTRIBUTION OF OXYGEN AND CARBON DIOXIDE IN THE IN VIVO CORNEA. I. THE OPEN EYE IN AIR AND THE CLOSED EYE.

I. Fatt and M. T. Bieber (Calif., U., Coll. of Eng., Berkeley).

Experimental Eye Research, vol. 7, Jan. 1968, p. 103–112. 15 refs.

Grant PHS HE 06796.

The steady-state distribution of oxygen and carbon dioxide in the *in vivo* cornea of rabbits for the open and closed eye are calculated from the diffusion, solubility, and consumption or production parameters of the system. The endothelium is shown to have little effect on the distribution because of its thinness. In the open eye, oxygen is transported into the cornea at the epithelia surface and out at the endothelial surface. Carbon dioxide moves from the aqueous humor through the cornea and out into the air. For the closed eye oxygen moves into the cornea across the epithelial and endothelial surfaces. Carbon dioxide moves out across both these surfaces. Postulating a stagnant aqueous humor layer of 0.150 mm. thickness on the posterior surface does not change the above conclusions.

A68-81001
EVALUATION METHODS FOR TOTAL NOISE EXPOSURE.

E. J. Rathe (Swiss Federal Labs. for Testing Materials and Res., Dubendorf, Switzerland) and J. Muheim (Swiss Federal Inst. of Technol., Zurich, Switzerland).

Journal of Sound and Vibration, vol. 7, Jan. 1968, p. 106–115. 10 refs.

The concept total toral noise exposure uses the duration of a noise signal as well as its level to define a comprehensive numerical index. Four practical evaluation methods are described. A comparison of the results obtained with samples of recorded noise shows that timesaving statistical methods can be applied.

A68-81002
THE EFFECTS OF SOAKING THE SKIN IN WATER AT VARIOUS TEMPERATURES ON THE SUBSEQUENT ABILITY TO SWEAT.

D. F. Brebner and D. McK. Kerslake (Roy. AF Inst. of Aviation Med., Farnborough, Hampshire, Great Britain).

Journal of Physiology, vol. 194, Jan. 1968, p. 1–11. 17 refs.

The ability of two human subjects to produce sweat was measured before and after immersion for up to four hr. in water at 32–36°C. (soak). The ability to produce sweat declined about four times as rapidly when the subject was soaked at 36°C. as at 32°C. The rate of decline characteristic of soaking at 36°C. was shown by subjects exercising in water at 35°C., but not at rest at 35°C. The difference appeared to be related to the presence or absence of moderate sweating (300 g./hr.) during the soak. At higher rates there was no further increase in the rate of decline. Soaking at 39°C. for five min., after which the water temperature was reduced to 33°C., caused a decline consistent with the supposition that while the subject was sweating the rate of decline was the same as that at 36°C. and for the rest of the time the same as that at 32°C. It is concluded that the rate of decline is increased if the sweat ducts are perfused, and some possible mechanisms are discussed.

A68-81003
PHYSIQUE AND SERUM PEPSINOGEN.

Albert Damon and Anthony P. Polednak (Harvard U., Dept. of Anthropol., Cambridge, Mass.).

Human Biology, vol. 39, Dec. 1967, p. 355–367. 18 refs.

Am. Heart Assn., Mass. Heart Assn., and Council for Tobacco Res.-U.S.A. supported research.

Among 1,987 army inductees, mean age 21.1 yr., serum pepsinogen was slightly but significantly associated with body build. Lean and masculine-looking men had the higher levels. Coefficients of correlation between serum pepsinogen and the three somatotype components (endo, meso-, and ectomorphy), and—for smaller numbers—gynandromorphy and the ponderal index (height/$\sqrt{}$ weight) ranged in absolute value between 0.10 and 0.14 ($P < 0.02$ to < 0.0001). Coefficients of regression were likewise highly significant. Among 141 Italian-American factory workers, mean age 42.6 yr., correlation coefficients between serum pepsinogen and the five foregoing physical traits, nine body dimensions, and seven paired combinations of dimensions, all pointed in the same direction and were similar in magnitude, but none reached statistical significance. The finding of higher serum pepsinogen levels among ectomorphs and lower ones among endomorphs confirms the previous results of another researcher. The lower levels of serum pepsinogen among mesomorphs, gynandromorphs, and stockily-built men (those with low ponderal index) are novel observations which, like the preceding, accord with the frequently noted association of peptic ulcer with lead body build. The present findings, if confirmed, strengthen the case for a constitutional factor in peptic ulcer.

A68-81004
BODY TEMPERATURE AND METABOLISM IN HYPERBARIC HELIUM ATMOSPHERES.
L. W. Raymond, W. H. Bell II, K. R. Bondi, and C. R. Lindberg (Naval Med. Res. Inst., Physiol. Sci. Dept., Bethesda, Md. and Navy Dept., Med. Dept. U.S. Navy Exptl. Diving Unit and Bur. of Med. and Surg., Washington, D. C.).
(Am. Physiol. Soc., Meeting, Washington, D. C., Aug. 1967).
Journal of Applied Physiology, vol. 24, May 1968, p. 678–684. 37 refs.

Five male deep-sea divers were observed during pressure chamber dives and decompression over a pressure range of 4.3–14.6 atmospheres absolute (Ata). Observations periods were begun 12 or more hr. after reaching maximum depth and continued during decompression. The chamber atmosphere was helium with small amounts of oxygen and nitrogen, and was quiescent and warm. Metabolic rate (seated, resting) increased only slightly above control, as large increases in convective heat transfer were accompanied by reductions in body heat transfer by radiation and evaporation. Mean skin temperature was reduced from its control value, and the high convective conductance (h_c) of hyperbaric helium narrowed the temperature gradient from skin to atmosphere to 1.6°C. at 14.6 Ata. Rectal temperature was not reduced and shivering did not occur. Arterial blood pressure, respiratory rate, and expired minute volume showed no systematic change under pressure but relative bradycardia was noted. No adventitious neuromuscular activity was observed. The divers' h_c values match those generated by a mathematical model for a cylinder undergoing natural convection.

A68-81005
PERFORMANCE LEVEL AND DRUG EFFECTS.
Satinder N. Manocha (Delhi U., Dept. of Psychol., India).
Psychopharmacologia, vol. 12, Jan. 16, 1968, p. 123–126. 8 refs.

The present experiment was conducted to examine the effects of a mild dose of a "tranquillizing" drug, chlorpromazine, on the lever-pressing behavior of albino rats. Twelve male rats were divided into two groups characterized by high and low performance on the basis of their lever-pressing scores in the Skinner box. The results showed that the responses of the high performance group were significantly depressed by the drug. Further, the results confirmed the contention of a previous investigation that habit strength and performance level operator antagonistically in determining the susceptibility of trained responses to the deleterious effects of drugs.

A68-81006
DISTRIBUTION FUNCTION OF PULMONARY BLOOD FLOW AND VENTILATION PERFUSION RATIO IN MAN.
Claude Lenfant and Takao Okubo (Wash., U., Depts. of Med. and Physiol. and Biophys. and Firland Sanat., Inst. of Respirat. Physiol., Seattle).
Journal of Applied Physiology, vol. 24, May 1968, p. 668–677. 16 refs.
Grants PHS HE 08465 and PHS HE 01892.

The distribution function of pulmonary blood flow was determined in five healthy subjects and five patients showing signs of diffuse obstructive pulmonary syndrome. The method used is based on the fact that at any time the mixed arterial oxygen content is related to the blood flow through the various compartments and to the respective oxygen contents. A procedure is described to overcome the alinearity of the oxygen dissociation curve. The rate of increase in O_2 content during a lung nitrogen washout is represented by the superposition of an infinite number of double exponential functions. The blood flow distribution as a function of clearance time constant was obtained with the aid of an iteration procedure and from the inversion of the Laplace transform by an approximation method. The comparison of this distribution function with that of ventilation and pulmonary lung volume lead to the construction of the continuous distribution of blood flow and lung volume as a function of $\dot{V}A/\dot{Q}$. In both groups of subjects a relative underperfusion of the low $\dot{V}A/\dot{Q}$ units is almost consistently observed. This is viewed as an adjustment which limits the hypoxia in patients.

A68-81007
PROTECTION AGAINST HYPERBARIC OXYGEN TOXICITY AFTER FEEDING N,N-DIPHENYL-P-PHENYLENE DIAMINE.
D. J. Pizzarello and A. C. Shircliffe (Bowman Gray School of Med., Depts. of Radiol. and Surg., Winston-Salem, N. C.).
Experientia, vol. 24, Feb. 15, 1968, p. 188–189. U.S. Rubber Co. supported research.

Mice were fed either N,N-diphenyl-p-phenylene diamine (DPPD) or sesame oil before being placed in an hyperbaric oxygen chamber at 5 atma. and with 100% O_2 until death occurred. Survival times were recorded, and histological examinations of lungs were performed. The lungs of DPPD-treated animals had fewer hemorrhagic and collapsed areas than those of untreated rats. It was concluded that DPPD affords protection against oxygen toxicity. The degree of protection varied directly with the number of applications, indicating that DPPD is accumulated in tissue. A strain difference in tolerance to hyperbaric oxygen was noted.

A68-81008
"GIGANTISM" OF CHLORELLA VULGARIS. I. RELATION OF GIGANTISM TO CELL GROWTH AND DIVISION.
Tadayoshi Higashiyama (Osaka U., Coll. of Gen. Educ., Dept. of Biol., Toyonaka, Japan).
Plant and Cell Physiology, vol. 8, Dec. 1967, p. 567–579. 10 refs. Yakuruto Co., Ltd. supported research.

The sugars which induced gigantism of *Chlorella* cells were glucose, fructose, galactose, mannose, xylose and arabinose. These sugars were utilized as respiratory substrates. The cellular division of *Chlorella* was stimulated by glucose and galactose, but suppressed by fructose, mannose, xylose and arabinose, while all these sugars evoked gigantism. No correlation was found between cellular division and gigantism. The photosynthetic activity of giant *Chlorella* varied with the kinds of sugars added. It was decreased by glucose, fructose and mannose, but was unaffected by other sugars such as galactose, xylose and arabinose. The respiratory activity of giant *Chlorella* cells was much higher than that of control cells. The amounts of protein-nitrogen and dry weight per unit volume of giant Chlorella were much less than those of control cells.

A68-81009
STUDIES ON CHLOROPHYLLASE OF CHLORELLA PROTOTHECOIDES. I. ENZYMATIC PHYTYLATION OF METHYL CHLOROPHYLLIDE.
Yasutane Chiba, Ichiro Aiga, Masahiro Idemori, Yoko Satoh, Kamehisa Matsushita, and Tsutomu Sasa (Kyushu U., Fac. of Sci., Dept. of Biol., Fukuoka, Japan).
Plant and Cell Physiology, vol. 8, Dec. 1967, p. 623–635. 24 refs. Min. of Educ. supported research.

The relation between chlorophyll content and the hydrolytic activity of chlorophyllase in *Chlorella prototheocoides* was examined. An increase in the activity was parallel to that in chlorophyll content during the development of green coloration, or greening course, in the bleached cells. The activity sharply declined and a paralleled disappearance of chlorophyll was also found during bleaching of the green cells. A partially purified water-soluble preparation of chlorophyllase was obtained by n-butanol treatment and fractionation with cold acetone. It showed high activity and hydrolyzed two mg. chlorophyll *a* per hr. per mg. protein. For separation and identification of the pigments concerned in the chlorophyllase reaction, a new solvent system of paper

chromatography was introduced. When methyl chlorophyllide *a* and phytol were incubated with the enzyme, two products were formed. By comparison with the Rf values of isolated pure substances, one was identified as chorophyll *a* and the other as chlorophyllide *a*. This enzyme did not catalyze the phytylation of free chlorophyllide *a*, but it had the ability to attach phytol to methyl chlorophyllide *a*. The final step in the biosynthesis of chlorophyll *a* is briefly discussed.

A68-81010
COMPARATIVE STUDIES OF PHOTOSYNTHETIC PROCESSES IN ORDINARY AND FULLY DEUTERATED ALGAE.
Shakuntala Bose, H. L. Crespi, M. I. Blake, and J. J. Katz (Argonne Natl. Lab., Ill.).
Plant and Cell Physiology, vol. 8, Dec. 1967, p. 545–555. 21 refs. AEC supported research.

The light-saturated growth rate of fully deuterated algae (*Chlorella*, *Scenedesmus* and *Synechococcus*) has been found less than that of ordinary algae by a factor of three to four. However, as compared to the net rate of photosynthesis, the Hill reaction rate indicates an unimpaired light reaction system. Analysis of cell extracts for amino acid content and ^{14}C-uptake studies indicate a decreased utilization of the products of photosynthesis by deuterated algae, probably because of a generally lowered protein metabolism. It was concluded that in algae D_2O does not have a pronounced effect on the light reaction in photosynthesis.

A68-81011
NEW RESULTS ON THE HEPATOTROPIC EFFECTS OF ASPARTIC ACID IN CARBON TETRACHLORIDE POISONING, BASED ON THE DETERMINATION OF SEVERAL PARAMETERS OF METHIONINE METABOLISM [NEUE ERGEBNISSE UBER DIE HEPATOTROPE WIRKUNG DER ASPARAGINSAURE IN TETRACHLORKOHLENSTOFFVERGIFTUNGEN AUF GRUND DER BESTIMMUNG EINIGER KONSTANTEN DES METHIONINSTOFFWECHSELS].
L. Fodor and I. Szántay (I's Med. Klin., Cluj, Rumania).
Nuclear-Medizin, vol. 7, Dec. 30, 1967, p. 448–454. 9 refs. In German.

The hepatotropic effects of aspartic acid in carbon tetrachloride poisoning were studied by means of determining the incorporation of ^{35}S-methionine into tissue proteins and the urinary excretion of intact ^{35}S-methionine and its degradation products. The results indicated a liver-protecting action of aspartic acid in carbon tetrachloride poisoning via protein synthesis, since the ^{35}S-content of tissue proteins is increased and urinary excretion of intact ^{35}S-methionine decreased in animals protected by aspartic acid.

A68-81012
DISTRIBUTION FUNCTION OF LUNG VOLUME AND VENTILATION DETERMINED BY LUNG N_2 WASHOUT.
Takao Okubo and Claude Lenfant (Wash., U., Depts. of Physiol. and Biophys. and Med. and Firland Sanat., Inst. of Respirat. Physiol., Seattle).
Journal of Applied Physiology, vol. 24, May 1968, p. 658–667. 20 refs.
Grants PHS HE 0845 and PHS HE 01892.

The continuous distribution function of lung volume and ventilation was determined by lung nitrogen washout in six healthy subjects and five patients showing signs of diffuse obstructive pulmonary syndrome. If the lung nitrogen-elimination curve, measured from mixed expired gas, is the summation of the N_2 volume washout curve of each alveolus, it can be represented by an equation similar to the Laplace transform of N(S). To obtain the distribution of lung volume as a function of clearance time constant (T), the Laplace transform is inverted with the aid of an approximation method. The distribution of ventilation as a function of T was determined from the relationship between lung volume and time constant. In normal subjects the frequency distribution curves of lung volume and ventilation are symmetrical with a relatively narrow base. The maximum frequency of both curves is located between 0.35 and 0.60 min. In patients with diffuse pulmonary obstructive syndrome the highest frequency of the lung volume distribution is shifted toward the longer time constants and the range of distribution is much larger than in normal subjects. The ventilation distribution function does not correspond to the lung volume distribution.

A68-81013
EVIDENCE SUGGESTING IMPORTANCE OF ROLE OF INTERBACTERIAL INHIBITION IN MAINTAINING BALANCE OF NORMAL FLORA.
Katherine Sprunt and Winifred Redman (Columbia U., Coll. of Physicians and Surgeons, Dept. of Pediat. and Babies Hosp., New York, N. Y.).
Annals of Internal Medicine, vol. 68, Mar. 1968, p. 579–590. 21 refs.
Grant NIH 5 K3-HD-22,493-03 and Health Res. Council supported research.

Evidence is presented in support of the hypothesis that interrelationships among organisms in the pharynx provide one of the mechanisms that maintain the bacterial *status quo*. Many organisms in the normal pharynx are capable *in vitro* of preventing the growth of other bacterial species—species with which they coexist *in vivo* or test organisms to which they are exposed experimentally. The majority of these "inhibitors" as revealed by the aerobic techniques described are alpha hemolytic streptococci. Detailed study of cultures from the posterior pharynx of patients undergoing massive antibiotic therapy for open heart surgery shows that as virtually all inhibitors (alpha hemolytic streptococci) in the patient's normal flora are suppressed by antibiotic therapy, overgrowth of bacteria not usually found in the pharynx routinely occurs. When therapy is withdrawn inhibitors reappear, and normal flora is reestablished. When inhibitors are resistant to the antibiotics used, no such overgrowth occurs. The data presented indicate that presence of the inhibitors plays a key role in maintaining the balance of normal flora.

A68-81014
SOMATOSENSORY RESPONSES OF RABBITS TO MECHANICAL STIMULI [SOMATOSENSORISCHE ANTWORTEN DES KANINCHENS AUF MECHANISCHE REIZE].
O. Vatter (Max-Planck-Inst. für Hirnforsch., Physiol. Abt., Göttingen, West Germany).
Zeitschrift für Biologie, vol. 115, Oct. 1967, p. 422–439. 21 refs. In German.

The cortical response of rabbits to mechanical cutaneous stimuli shows a β- and a δ-afference-component. The latter afferences are less prominent in the cortex than in the first synaptic station of the central nervous system. The response appears mainly in the contralateral brain. Ipsilateral responses are only observed under strong stimulation or stimulation near the midline. The cornea does not respond with a β-afference-component. In the mucosa oris et nasi the characteristic pain response with a conduction velocity of about five m./sec. is absent. Pulling on the claws evokes an on-response of the muscle and an off response of the tendon-spindle-afference. The mechanical latencies of skin and sinus hairs are investigated under different conditions, such as under vibrations of higher frequency.

A68-81015
3-METHOXY-4-HYDROXYMANDELIC ACID EXCRETION DURING PHYSICAL EXERCISE.

Charles Neal, Carl Smith, Kurt Dubowski, and John Naughton (Okla., U., Med. Center, Neurocardiol. Res. Program and Depts. of Med. and Physiol., Oklahoma City).
Journal of Applied Physiology, vol. 24, May 1968, p. 619–621. 10 refs.
Grants PHS HE-06286-07, PHS DC-00170-03, and PHS 1-K3-HE-31,272-02.

The relationship of the demands of muscular exercise to urinary catecholamine excretion was explored in 19 men varying in age from 21 to 28 yrs., after 2.5 hr. of normal activity and after a second 2.5 hr. period, the first portion of which included graded treadmill exercise. Each subject was given 5.0 ml./kg. water to drink immediately before and again immediately after the work performance. The subjects performed the Balke physical working capacity test to determine their peak O_2 intake. Thereafter, following a 10 min. rest period, they worked for 45 min. at an energy expenditure which approximated 50% of their peak aerobic work capacity. Respiratory gas exchange was determined every 15 min. 3-methoxy-4-hydroxymandelic acid (VMA) concentrations were determined on the control and exercise urine specimens. The results revealed statistically significant increases of the VMA excretion in all exercise specimens varying rrom 9.0 and 98.0 μg./hr. A statistically significant linear relationship ($P < 0.05$) between the level of energy expenditure and the quantity of catecholamines excreted during work performance was established.

A68-81016
LACTIC DEHYDROGENASE ISOZYMES: VARIATIONS IN THE PLASMA OF MEN EXPOSED TO COLD.
Milton Mager, William F. Blatt, and Russell W. Newman (U.S. Army Res. Inst. of Environ. Med., Biochem.-Pharmacol. and Mil. Ergonomics Labs., Natick, Mass.).
Journal of Applied Physiology, vol. 24, May 1968, p. 616–618. 6 refs.

Total plasma lactic dehydrogenase (LDH) activity and isozyme distribution were determined in 17 cold-acclimatized Negro men. Both total LDH levels and the ratio of heart-to-muscle subunit content were significantly increased over pre-cold exposure values. These plasma changes are in accord with similar findings previously demonstrated in the cardiac tissue of cold-acclimatized rats.

A68-81017
INFLUENCE OF CO_2 ON VENTILATORY ACCLIMATIZATION TO ALTITUDE.
Edmond I. Eger II, Ralph H. Kellogg, Allan H. Mines, Miguel Lima-Ostos, Callis G. Morrill, and Donald W. Kent (Calif., U., Med. Center, Depts. of Physiol. and Anesthesia, San Francisco).
Journal of Applied Physiology, vol. 24, May 1968, p. 607–615. 36 refs.
Grants PHS HE-07946, PHS 5K3-GM-17685, PHS GM-09262, PHS 5T1-GM-00927, and PHS 5T5-MG-43-04.

In four physiologists we found that eight hr. of hypoxia at constant alveolar carbon dioxide tension (PA_{CO_2}) produced a shift to the left of the ventilatory response to CO_2 (VE versus PA_{CO_2} with inspired oxygen tension (PI_{O_2}) = 190 mm. Hg). The magnitude of the shift was taken as a measure of respiratory acclimatization during the eight hr. and was directly related to how low PA_{CO_2} was held relative to that subject's normal PA_{CO_2} (mm. Hg ΔPA_{CO_2} during acclimatization). The shift averaged 0.36 mm. Hg/mm. Hg ΔPA_{CO_2} during acclimatization. In a similar study without hypoxia we found that eight hr. of controlled PA_{CO_2} also produced a leftward shift of the CO_2 response, the magnitude of the shift again being directly related to mm. Hg ΔPA_{CO_2} during acclimatization but only half as great, namely 0.18 mm. Hg shift per mm. Hg ΔPA_{CO_2}. While the event primarily responsible for the shift is presumably the reduction of cerebrospinal fluid HCO_3^- in response to brain tissue alkalosis, the differences between normoxia and hypoxia may relate to differences in lactic acid generation and/or to differences in cerebral blood flow. All of the above results were found to be superimposed on a diurnal shift of −0.5 to −3.5 mm. Hg which was independent of the P_{CO_2} or PO_2 during acclimatization.

A68-81018
DIGITAL CODER FOR REAL-TIME CLOCKING AND DATA IDENTIFICATION IN PHYSIOLOGIC RESEARCH.
Norman A. Singer and Masato Takahashi (Calif., U., School of Med., Dept. of Pediat., Los Angeles).
Journal of Applied Physiology, vol. 24, May 1968, p. 711–714.

A digital coder suitable for use in physiological research and clinical medicine is described. It produces a binary-coded-decimal number represented as a train of negative and positive pulses which can be printed on an oscillograph channel or recorded on magnetic tape. For computer analysis, the unique wave shape of the code allows identification by digital computer programs. The coder can be used as an event marker, real-time clock, or for subject identification, and can be used alone or in conjunction with an electronic code searcher for efficient data identification and retrieval.

A68-81019
LIMITATIONS TO THE PREDICTION OF MAXIMUM OXYGEN INTAKE FROM CARDIAC FREQUENCY MEASUREMENTS.
C. T. M. Davies (Med. Res. Council, Environ. Physiol. Res. Unit, London School of Hyg. and Trop. Med., London, Great Britain).
Journal of Applied Physiology, vol. 24, May 1968, p. 700–706. 26 refs.

The cardiac frequency (f_H) and O_2 consumption ($\dot{V}O_2$) curves of 80 healthy male subjects aged 20–50 yr. in relation to the over-all limitations of predicting maximum oxygen intake ($\dot{V}O_{2\,max}$) have been examined, together with the accuracy of the Åstrand–Rhyming, Margaria, and Maritz–Wyndham prediction nomograms. The major drawback to all extrapolation methods is the asymptotic nature of $f_H/\dot{V}O_2$ curve. This introduces an error of 1,200 ml. at the 95% confidence level and precludes accurate and reliable estimation of $\dot{V}O_2$ max. In comparison, the error due to the intersubject variability in $f_{H\,max}$ is small and insignificantly different from that to be expected from random day-to-day variations in measurement of f_H and $\dot{V}O_2$. The mean errors with 95% confidence limits using the three nomograms are −624 ± 836, −529 ± 776, and −430 ± 708 ml., respectively. The underlying reasons which might be responsible for the asymptotic value of the f_H curve and alternative formulas for predicting $\dot{V}O_2$ max are discussed. It is concluded that if an accuracy greater than ±15% is required, then there is no alternative but to measure $\dot{V}O_{2\,max}$ directly.

A68-81020
RESPIRATORY RESPONSES TO HEADSTAND POSTURE.
Shanker Rao (Armed Forces Med. Coll., Dept. of Physiol., Poona, India).
Journal of Applied Physiology, vol. 24, May 1968, p. 697–699. 8 refs.

Respiratory responses to tilting of the body are available through all the degrees of a circle except for the −90° position. In the present work a comparative study of pulmonary subdivisions is made in supine, erect, and −90°, or headstand, posture of the body. Mean results show that VC is maximum while standing erect and minimum in the head-down position. Little variation is seen in mean RV and TLC in the three postures. FRC for the vertical postures is 14.2% over that of the horizontal supine and nearly the same in erect (90°) and head-down (−90°) positions. Increase or decrease of IC in the three postures is partly compensated for by a proportionate variation of ERV; ERV is the most variable of all the subdivisions ($P < 0.05$). The reasons for variation of the

different lung subdivisions in the three positions of the body are discussed in the light of gravitational adjustments to circulation and elastic forces acting on the thorax and abdomen.

A68-81021
EFFECT OF PULMONARY VASCULAR PRESSURES ON SINGLE-BREATH CO DIFFUSING CAPACITY IN DOGS.

J. H. Burgess, J. Gillespie, P. D. Graf, and J. A. Nadel (Calif., U., San Francisco Med. Center, Cardiovascular Res. Inst. and Dept. of Med., San Francisco).

Journal of Applied Physiology, vol. 24, May 1968, p. 692–696. 15 refs.
Grants PHS HE-5251 and PHS HE-06285.

Single-breath carbon monoxide diffusing capacity was used to study effects of changes in pulmonary vascular pressures on the volume of blood contained in pulmonary capillaries. Temporary occlusion of the left pulmonary artery decreased diffusing capacity of the left lung and increased diffusing capacity of the right lung in dogs, but had no significant effect on alveolar pressure, alveolar volume, or left atrial pressure. The effect was similar in closed- and open-chest dogs and was not abolished when the lung was ventilated with CO_2. During occlusion, increasing left atrial pressure increased diffusing capacity to or above the control level in the occluded lung; when left atrial pressure was high in the control state, occlusion had no significant effect on diffusing capacity. These studies suggest that pulmonary capillary blood volume is affected by both inflow and outflow pressures as they influence transcapillary pressure.

A68-81022
METHODS IN PSYCHOPHYSIOLOGY.

Edited by Clinton C. Brown (Johns Hopkins U., School of Med., Baltimore, Md.).

Baltimore, Williams and Wilkins Co., 1967. xi+502 p. Many refs. $16.75.

This work presents the latest developments of the most used and potentially most important methods and procedures in psychophysiology. Topics included are: (1) electrical properties of the skin; (2) techniques of plethysmography; (3) measurement of respiration; (4) measurement of biological temperatures; (5) interarea electroencephalographic phase relationships; (6) principles and application of rheoencephalography, a diagnostic method for the study of cerebral circulation; (7) measurement of blood flow and blood pressure; (8) measurement of salivation; (9) quantification of olfactory stimuli; (10) research electroencephalography; (11) the nature of classical conditioning; (12) operant conditioning; (13) data stage; (14) telemetry and telestimulation; (15) measurement of physiological phenomena; and (16) the laboratory computer in psychophysiology.

A68-81023
DEOXYRIBONUCLEIC ACID SYNTHESIS IN THE HEART MITOCHONDRIA AFTER ACUTE AND EXHAUSTIVE EXERCISE.

R. P. Laguens and C. L. Gómez Dumm (Comisión de Invest. Cient. de la Prov. de Buenos Aires, La Plata, Argentina).

Experientia, vol. 24, Feb. 15, 1968, p. 163–164. 13 refs.

The mitochondria in the hearts of rats were examined with phase contrast and electron microscopy after the rats were submitted to physical exercise by forced swimming. The electron micrographs showed the existence of intramitochondrial fibers. Phase contrast and electron microscope studies of mitochondrial pellets processed for radioautography showed no intact cells or nuclei. The appearance of intramitochondrial fibers tentatively identified as deoxyribonucleic acid (DNA) according to morphological criteria, and the captation of tritiated thymidine would indicate that, under the stimulus of acute and exhaustive exercise, the mitochondria of the heart muscle fibers are capable of active DNA synthesis.

A68-81024
COMPARATIVE RESPONSES OF TWO PROTOZOA TO TWO TYPES OF RADIATION.

S. A. Hodson (East Anglia, U., School of Biol. Sci., Norwich, Great Britain).

Experientia, vol. 24, Jan. 15, 1968, p. 59. 6 refs.

Two closely related protozoa, *Actinophrys sol* and *Actinosphaerium nucleofilum* were subjected to irradiation by UV-light and ionizing radiation in order to disprove an hypothesis that the two types of radiation act in the same manner. Results showed that any particular radiation acts in the same manner on both species, but that ionizing radiation and UV-light act on different systems in the cells as shown by the differences in resistance in both species to the separate radiations.

A68-81025
FREE AMINO ACIDS IN BLOOD SERUM OF HEDGEHOGS IN DEEP HYPOTHERMIA AND AFTER SPONTANEOUS AROUSALS.

R. Kristoffersson and Saara Broberg (Helsinki, U., Dept. of Physiol. Zool., Finland).

Experientia, vol. 24, Feb. 15, 1968, p. 148–150. 16 refs.
Natl. Res. Council for Sci. supported research.

The blood serum levels of 22 free amino acids in hedgehogs in midwinter during deep hypothermia, after spontaneous arousal and in active, awake animals during the non-hibernating season were described. A comparison of animals in deep hypothermia versus animals spontaneously aroused revealed an increase of free amino acids after arousal. However the arginine level was decreased, and valine, leucine and isoleucine showed no significant increase. A comparison of animals aroused spontaneously in mid-winter with animals awake in the spring showed that total amino acids were almost equal.

A68-81026
CYCLIC VARIATION IN THE AMPLITUDE OF A BRAIN STEM REFLEX DURING SLEEP AND WAKEFULNESS.

M. H. Chase, D. J. McGinty, and M. B. Sterman (Calif., U., School of Med., Depts. of Anat. and Physiol., Los Angeles and Veterans Admin. Hosp., Sepulveda, Calif.).

Experientia, vol. 24, Jan. 15, 1968, p. 47–48. 12 refs.
Grant PHS MH-10083 and Contract PH-43-66-59; Veterans Admin. supported research.

Changes in the masseteric monosynaptic reflex were investigated in unanesthetized, unrestrained cats during sleep and wakefulness in order to determine brain-stem reflex transmission fluctuations. A gradual, but statistically significant ($p \leq 0.05$), decrease in the amplitude of the reflex response was observed as the animal passed from the alert state through the drowsy and quiet sleep states, and into active sleep. During active sleep the reflex response was almost completely abolished.

A68-81027
CIRCADIAN ACROPHASES OF HUMAN 17-HYDROXYCORTICOSTEROID EXCRETION REFERRED TO MIDSLEEP RATHER THAN MIDNIGHT.

F. Halberg and H. Simpson (Minn., U., Depts. of Pathol., Minneapolis and Roy. Infirmary, Glasgow, Great Britain).

Human Biology, vol. 39, Dec. 1967, p. 405–412. 5 refs.
NASA Grant NsG-517 and Grant PHS 5-K6-GM-13,981.

An average crest time of the circadian rhythmic change in 17-hydroxycortisodteroid excretion, the so-called circadian acrophase of this urinary variable, was determined by several kinds of electronic computer anslyses. Data discussed earlier by one of

the investigators on the basis of time plots were thus examined at a higher level of resolution by objective procedures with rather general applicability in anthropology, for the dduble purpose of rhythm detection and parameter estimation. When local midnight served as phase reference in comparing the acrophases of the circadian rhythm in 17-hydroxycorticosteroid excretion of groups of male and female "Europeans" (from Glasgow, Scotland) and of male and female Equatorial "Amerindians" (from South Dutch Guiana), several differences in timing of the rhythm were noted; these are tentatively interpreted as spurious ones since an adjustment of the circadian acrophase to the middle of the habitual sleep-span as phase reference results in an obliteration of all inter-population differences in timing. Indeed, with midsleep as phase reference there is remarkable agreement among the circadian acrophases in 17-hydroxycorticosteroid excretion of male or female subjects from different continents and cultures.

A68-81028
EFFECT OF TEMPERATURE AND PYROGENS ON SINGLE-UNIT ACTIVITY IN THE RABBIT'S BRAIN STEM.

M. Cabanac, J. A. J. Stolwijk, and J. D. Hardy (John B. Pierce Found. Lab. and Yale U., School of Med., Dept. of Physiol., New Haven, Conn.).

Journal of Applied Physiology, vol. 24, May 1968, p. 645–652. 41 refs.
Grant NIH NB04655-05.

Single-unit activity was recorded in the brain stem of urethanized rabbits during changes in local temperature between 32° and 42°C. Thermosensitive units were found which respond to temperature with bell-shaped curves peaking generally either above or below the usual range of body temperature, 37°–39°C. Units which increased firing rate with increase in temperature in the 37°–39°C. range were designated "warm" units and those with the opposite response as "cold" units. Temperature responses of a total of 50 warm and 27 cold units and a large number of temperature-insensitive units were observed, and 19 units were studied following the injection of pyrogens. Seven to 13 min. following intravenous injection of typhoid vaccine ten warm units were inhibited, half of these units showed a decrease in both their spontaneous activity and temperature sensitivity and five others completely stopped firing. Seventeen to 21 min. after injection of pyrogen three cold units increased both spontaneous activity and temperature sensitivity, and in two instances there was no change in cold-neuron response. Three out of four insensitive units were unchanged following pyrogen while one was inhibited. These findings confirm that pyrogens affect the hypothalamus and provide added information as to their specific action on temperature-sensitive neurons.

A68-81029
BIPLANE VIDEOANGIOGRAPHY.

John C. P. Williams, Ralph E. Sturm, Anastasios G. Tsakiris, and Earl H. Wood (Mayo Clin. and Mayo Found., Sect. of Physiol. and Minn., U., Mayo Graduate School of Med., Rochester).

Journal of Applied Physiology, vol. 24, May 1968, p. 724–727. 8 refs.
NASA Grant NsG-327 and Grant NIH HE-3532.

A biplane video-angiographic system for dynamic measurement of the volume and shape of the left ventricle is described. The two images of the ventricle are displayed and recorded on the left and right halves of the same video picture. The electrocardiogram or a pressure pulse, a code number, and the position of the angiocardiographic injection syringe plunger are recorded simultaneously on a time-shared basis as analog voltages on an FM data track of the same video tape for electronic synchronization of the phase of the cardiac cycle with video events. Synchronized 35-mm. pictures of the video screen are used for manual measurement of end-diastolic and systolic volumes. Alternatively, measurement of the horizontal traversal times of the video beam from the edge of the field and between the left and right borders of the two projections of the left ventricle for the approximately 50 horizontal lines covering its image will allow on-line computer computation of its volume and shape at the video field rate of 60/sec.

A68-81030
PREDICTION OF SOLAR HEAT LOAD ON MAN.

Warren L. Roller and Ralph F. Goldman (U.S. Army Res. Inst. of Environ. Med., Natick, Mass.).

Journal of Applied Physiology, vol. 24, May 1968, p. 717–721. 9 refs.

A model is presented for calculating the solar heat load on a man in a given radiant environment. Factors considered include adjustments of surface area for clothing and posture, the absorptance, reflectance, and transmittance of the surface material, and the percentage of absorbed solar heat actually reaching the skin. Average maximum calculated values of solar heat loads were 400 kcal./hr. for a nude tanned Caucasian, 500 kcal./hr. for a nude Negroid, 200 kcal./hr. when wearing a military fatigue uniform, and 125 kcal./hr. when wearing heavier winter clothing.

A68-81031
FIXATION OF TARGETS NEAR THE ABSOLUTE FOVEAL THRESHOLD.

Robert M. Steinman and Robert J. Cunitz (Md., U., Dept. of Psychol., College Park).

Vision Research, vol. 8, Mar. 1968, p. 277–286.
Grant PHS NB 06361-02.

A contact lens technique was used to record two dimensional eye movement patterns while subjects fixated small "white" light targets just above and two levels below foveal threshold. The subthreshold targets disappeared periodically. Eye movements, primarily drifts, were responsible for these disappearances. They repeatedly moved subthreshold targets near to the insensitive preferred central fixation locus. Disappearances were followed by a target-finding saccade that placed the target in a more sensitive retinal region. Each subject's saccades were consistent but idiosyncratic in direction. In a second experiment subjects were instructed to make target-finding saccades in four specified directions. They did so and subsequent movements brought the target back to the central disappearance position. The importance of drifts and saccades in the return varied with the direction of the voluntary target-finding saccade. These experiments imply a reflexive guidance system that comes into play when the fixation target is feeble. This system is maladaptive: it guides faint targets to a retinal region where they can not be seen.

A68-81032
INDIVIDUAL DIFFERENCES IN FIGURAL AFTEREFFECT POTENCY: AFTEREFFECT TRACE VS IMMEDIATE STIMULUS CONTEXT AS A DETERMINER OF PERCEPTION.

Ludwig Immergluck (San Francisco State Coll., Calif.).

Psychonomic Science, vol. 10, Feb. 25, 1968, p. 203–204. 6 refs.
Natl. Sci. Found. supported research.

When, given the same stimulus pattern, the direction of a perceptual response can be determined by either the strength of an aftereffect trace or by an immediately present stimulus context. Field-independent subjects responded in accordance with the aftereffect trace, while field-dependent subjects' perceptions were influenced by the immediately present stimulus context. The data at hand continue to demonstrate significant differences in aftereffect potency between field-independent and field-dependent subjects.

A68-81033
PREFERENCE FOR DIFFERENT AUDITORY STIMULUS SEQUENCES IN VARIOUS AGE GROUPS.
Ernest E. Boesch, Paul B. Baltes, and Lothar R. Schmidt (U. des Saarlandes, Saarbrücken, West Germany).
Psychonomic Science, vol. 10, Feb. 25, 1968, p. 205–206. 9 refs.

Male subjects ranging in age from eight to 20 yr. were presented with all possible pairs of eight different auditory stimulus sequences consisting of different numbers of single stimuli within a ten sec. interval. The number of single auditory stimuli varied in logarithmic steps from 30 to 100 per ten sec. Subjects were asked to make preference judgments with regard to pleasantness. Analyses of variance yielded significant age differences in preference measures. Older subjects preferred increasingly slower stimulus sequences.

A68-81034
"GIGANTISM" OF CHLORELLA VULGARIS. II. MECHANISM OF INDUCTION OF CIGANTISM [SIC].
Tadayoshi Higashiyama (Osaka U., Coll. of Gen. Educ., Dept. of Biol., Toyonaka, Japan).
Plant and Cell Physiology, vol. 8, Dec. 1967, p. 581–593. 13 refs.
Yakuruto Co., Ltd. supported research.

Based on the microscopic observations, two stages, "giant cell stage" and the subsequent "palmelloid body stage", were distinguished in the process of formation of giant *Chlorella* induced by the addition of sugars. The "giant cell" is much larger in size than the control cell, but the other morphological features are the same as those of the latter. The "palmelloid body" is a form composed of many conjoined autospores. When a high concentration of glucose was maintained in the medium, gigantism was also maintained. Under this condition, the alga shows a cyclic transformation between "giant cell" and "palmelloid body" without returning to the small single cells. Large amounts of carbohydrate composed of hexose were found to be accumulated in the giant algal cells, and it was inferred that this carbohydrate accumulation causes greater enlargement of cell volume as compared with control cells. Uronic acids, which were found to be absent in the control cells, were formed and lost in the cells cultured in the glucose medium in parallel with the appearance and disappearance of gigantism. Pectic substances, from which uronic acids are considered to be derived during the extraction procedure, were found to be present only in giant *Chlorella*. Based on these results it was inferred that inductive formation of the pectic substances is causally related with the appearance of "palmelloid body".

A68-81035
MAXIMUM AEROBIC CAPACITY AND RUNNING PERFORMANCE AT ALTITUDE.
John A. Faulkner, James Kollias, Cutting B. Favour, Elsworth R. Buskirk, and Bruno Balke (Mich., U., Dept. of Phys. Educ., Ann Arbor and Pa. State U., Lab. for Human Performance Res., University Park).
Journal of Applied Physiology, vol. 24, May 1968, p. 685–691. 17 refs.
Contracts DA-49-193-MD-2709, DA-79-193-MD-2446 and Grant NIH GM 12554.

Data were obtained on three groups during a control period at 200–300 ml. (sea level, SL), a six-wk. experimental period at different altitudes, and a postaltitude control period at SL. A low-altitude group remained at 2,300 m. for six wk., a medium-altitude group underwent exposures to 2,300 and 3,100 m., and a high-altitude group spent time at 2,300 and 4,300 m. Compared to SL control values, the average decrease in aerobic capacity ($\dot{V}O_{2\ max}$) during a treadmill run was 13% at 2,300 m., 20% at 3,100 m., and 29% at 4,300 m. Although the decrements in $\dot{V}O_{2\ max}$ were larger than those previously reported during bicycle ergometer tests at equivalent altitudes, the slope of the relationship was in reasonable agreement with previously published data. No change in $\dot{V}O_{2\ max}$ was observed in the low-altitude group during six wk. of training at 2,300 m. At 2,300 m. pulmonary ventilation at $\dot{V}O_{2\ max}$ increased only 6% over SL values. At 2,300 m. time trials of one-three mi. were 2–13% slower than at SL. During the postaltitude control period, $\dot{V}O_{2\ max}$ and time-trial performances were not significantly different from the prealtitude control values.

A68-81036
THE HEART MUSCLE IN FUNCTIONAL OVERLOAD AND HYPOXIA: A BIOCHEMICAL AND ULTRASTRUCTURAL STUDY.
Giancarlo Pelosi and Giovanni Agliati (Milan, U., Inst. of Pharmacol., Sect. for Invest. of Subcellular Struct., Italy).
Laboratory Investigation, vol. 18, Jan. 1968, p. 86–93. 34 refs.

A cardiac overload was produced by forcing rats to swim for eight hr. The ultrastructure of the heart was clearly altered. Mitochondria were enlarged and sometimes swollen. The myocardial adenosine triphosphate (ATP) content was increased, while the O_2 uptake of the homogenate was unchanged. These results were compared with those obtained in rats kept hypoxic for eight hr. or forced to swim under hyperbaric conditions. In hypoxic animals myocardial mitochondria were quite normal. Their shape as well as the course of the cristae were irregular, while their size was completely normal. The ATP content was markedly increased, while the O_2 uptake was unchanged. In the animals exhausted from hyperbarism, the ultrastructural and biochemical modifications were practically analogous to those observed in the animals exhausted at normal air pressure. It was concluded that probably neither the decrease of the heart oxygen supply nor a deficit of available energy is the most important factor in the mechanism responsible for the transformation of the cardiac overload in hypertrophy.

A68-81037
DIRECTIONAL TENDENCIES DURING CIRCADIAN FREQUENCY VARIATIONS [RICHTUNGSTENDENZ BEI CIRCADIANEN FREQUENZANDERUNGEN].
Michael Lohmann (Calif., U., Dept. of Oceanog., San Diego).
Biologisches Zentralblatt, vol. 86, Sep.–Oct. 1967, p. 623–628. 5 refs. In German.

The dark-active insects *Tenebrio, Blaberus,* and *Leucophaea* have longer circadian periods under constant light conditions (LL) than in total darkness (DD). Repeated changes between LL and DD, however, reveal additional influences of the light conditions upon period length, since period lengths on the average do not return to their former values under identical conditions. A general tendency of increasing period length can be observed which, after several alternations in light conditions, apparently approaches an asymptote. These results can be described as "after-effects" of the preceding conditions (period lengths) only in the case of the increasing DD values. The increasing period lengths in LL (after preceding short periods in DD) require another interpretation. Two possibilities are discussed: (1) an "ageing" effect; and (2) an effectuation of lighting transitions, such that DD to LL has a stronger effect than LL to DD.

A68-81038
INVESTIGATION INTO THE NUTRITION OF COMPETITIVE SPORTSMEN FROM THE VIEWPOINT OF QUALITY [ERNAHRUNGSUBERPRUFUNG IN QUALITATIVER HINSICHT BEI LEISTUNGSSPORTLERN].
H.-K. Gräfe
Die Nahrung, vol. 11, no. 7/8, 1967, p. 551–558. 13 refs. In German.

It is shown that deliberate food selection and consideration of recent scientific findings in nutrition contribute to the planning of the most appropriate supply of basic and accessory nutrients for athletes in competitive sports during the training period. A five-point classification of competitive sportsmen from the viewpoint of nutritional physiology is followed by concrete suggestions for the consumption of basic nutrients with respect to desired caloric percentages. Caloric requirements range, according to the sport, from 12 to 16 kcal.% for protein, from 28 to 32 kcal.% for fat and from 55 to 56 kcal.% for carbohydrates. Likewise, suggestions for the intake of mineral substances and vitamins are presented and discussed. The present investigation aims at establishing and explaining the theoretical basic requirements for scientific meal planning for competitive sportsmen.

A68-81039
MEASUREMENTS OF ENERGY CONSUMPTION AS A CONTRIBUTION TO THE PROBLEM OF NUTRITION BALANCING [ENERGIEVERBRAUCHSMESSUNGEN ALS BEITRAG ZUM PROBLEM DER ERNAHRUNGSBILANZIERUNG].

R. Maune and H.-A. Ketz.

Die Nahrung, vol. 11, no. 7/8, 1967, p. 567–582. 21 refs. In German.

The average daily time-tables and energy consumptions during professional and so-called basal activities (sitting, standing and walking without additional loading) were determined for 1,050 subjects of 53 professions. For the time studies, a combined recording-interviewing method was used and for the measurements of energy consumption, a combination of respirometer and physical gas analyzer (transportable performance tester "Spirolyt") with evaluation by means of nomograms was used. Despite considerable individual variations, the values for the energy equivalents (kcal./min./kg. $^{-1}$) of the basal activities varied little with regard to the occupational groups. The differences between the mean energy equivalents for men and women were statistically significant at the P = 0.01 level for sitting and standing, but not for walking. Even in occupational groups with very light activities, the daily caloric consumption (expressed in sixths of the basis metabolic rate) was not under 10 sixths. In groups with moderate to heavy activities, it amounted for the most part to 13 sixths. The regression of the measurable energy equivalent in the professional group on the calculated sixth of the working time was significant in males as well as in females. The correlation factors for men and women were 0.98 and 0.95, respectively.

A68-81040
THE FLASHBLINDNESS PROBLEM IN THE AIRCRAFT COCKPIT.

James E. Hamilton (USAF School of Aerospace Med., Aerospace Med. Div., Brooks AFB, Tex.).

(Am. Acad. of Optometry, Ann. Meeting, Denver, Dec. 12, 1966). *American Journal of Optometry and Archives of American Academy of Optometry*, vol. 45, Feb. 1968, p. 86–95. 10 refs.

Defense Atomic Support Agency supported research.

Research control studies were conducted in various aircraft simulators and one jet fighter to obtain quantitative performance data from flashblindness and to measure the visual recovery time during several series of test flights. Recovery time and the effect of flashblindness on aircraft control were measured. A summary of the flashblindness problem in the cockpit is presented.

A68-81041
THE EFFECT OF LOW VS. HIGH BEAM HEADLIGHTS AND AMETROPIA ON HIGHWAY VISIBILITY AT NIGHT.

J. Strickland, B. Ward, and M. J. Allen (Ind. U., School of Optometry, Bloomington).

American Journal of Optometry and Archives of American Academy of Optometry, vol. 45, Feb. 1968, p. 80–85.

Grant PHS AC00186; Am. Optometric Found. and Motorists Vision supported research.

A study was made of the effects of hyperopia, myopia, and increased optical scatter upon the detection distance of a large obstacle in the roadway when various combinations of headlights and opposing vehicle separations were used in a static test arrangement. Remarkable impairment of detection of the obstacle occurred with ametropia and with increased optical scattering. None of the situations were worsened by using high beams rather than low beams on the opposing vehicles. In fact, improvements were noted with high beams.

A68-81042
A STUDY OF DETECTION, SEARCH, MATCHING, AND MEMORY FUNCTIONS.

M. S. Mayzner, M. E. Tresselt, and Jaimie Pezenik (N. Y. U., New York City).

Psychonomic Science, vol. 10, Feb. 25, 1968, p. 217–218. 6 refs.

The present study develops an experimental paradigm designed to examine detection, search, matching, and memory functions as they relate to visual signal processing in man. Subjects are presented with two lines of ten letters each and required to detect a target letter common to both lines. The results clearly show the effects of display times and number of targets present with such a paradigm, and its usefulness in studying general problems of visual information processing is briefly discussed.

A68-81043
REVERSIBLE PHYSIOLOGIC DISABILITY AS A CRITERION FOR ALTITUDE TOLERANCE OF THE RAT.

R. Rosenstein and C. M. Moore (FAA, Civil Aeromed. Inst., Oklahoma City, Okla.; Veterans Admin. Center, White River Junction, Vt.; and Dartmouth Med. School, Dept. of Pharmacol. and Toxicol., Hanover, N. H.).

(Aerospace Med. Assn., 35th Ann. Meeting, Miami Beach, 1964). *Journal of Applied Physiology*, vol. 24, May, 1968, p. 733–735. 7 refs.

A method has been developed whereby a measure of the altitude tolerance of the rat can be made on the basis of partial rather than total loss of physical capacities essential for survival. The method involves the use of an inclined plane which has been placed in a water tank. The end point is based upon the inability of a rat to retain a position on the plane.

A68-81044
PREVENTION OF CARBON TETRACHLORIDE INDUCED ADRENAL HYPERTROPHY BY THE USE OF ASCORBIC ACID IN RATS.

A. Chatterjee and N. R. Bardhan (Raja Peary Mohan Coll., Dept. of Physiol., Uttarpara, Hooghly, West Bengal, India).

Endokrinologie, vol. 51, no. 5/6, 1967, p. 306–307. 13 refs.

Carbon tetrachloride, a nonspecific stressor, was found to induce adrenocortical hypertrophy in the rat. Ascorbic acid prevented the effect of carbon tetrachloride on the adrenocortical physiology.

A68-81045
TOLERANCE OF VERY HOT HUMID ENVIRONMENTS BY HIGHLY ACCLIMATIZED BANTU AT REST.

C. H. Wyndham, C. G. Williams, J. F. Morrison, A. J. A. Heyns, and J. Siebert (Transvaal and Orange Free State Chamber of Mines, Human Sci. Lab. and Phys. Sci. Lab., Johannesburg, South Africa)
British Journal of Industrial Medicine, vol. 25, Jan. 1968, p. 22–39. 14 refs.

Studies of human tolerance to extremely hot, humid environments were carried out in climatic rooms with acclimatized Bantu subjects sitting at rest. Rectal temperatures and heart rates were measured hourly. Electroencephalograms were taken, and the subjects were observed by Bantu psychologists for behavioral changes. Water balances and circulatory responses were also recorded. From the results a curve was presented which indicated the length of time after which the average acclimatized Bantu could be expected to have reached the limit of tolerance according to certain given criteria at various wet bulb temperatures.

A68-81046
METHODS FOR DETERMINATION OF THE BODILY CENTER OF GRAVITY FROM THE POSITION OF THE JOINT POINTS [METHODE ZUR BESTIMMUNG DES KORPERSCHWERPUNKTES AUS DER LAGE DER GELENKPUNKTE].
Hartmut Dickwach.
Theorie und Praxis der Körperkultur, vol. 16, Dec. 1967, p. 1108–1115. 9 refs. In German.

A method was illustrated for the determination of the center of gravity of the body according to the method of Knoll–Eggers in which determinations are from the position of joint points in contrast to the conventional methods. Up to now it was necessary to determine the center of gravity of the individual parts of the body. The imaginary weights of the joint points were calculated from the known weights of the body parts. A method was applied for a single mass determination with the direct aid of a drawing for the individual joint point nomogram values whose coordinated sums give the center of gravity of the body. The nomogram ratios of the joint weights to the total weight were established. Special biomechanical investigations for combining experimental graphic determinations of the center of gravity of the body were suggested in order to limit the additive errors from the graphic and computation methods through determinations of individual details of physical proportions.

A68-81047
AN INTEGRATED-CIRCUIT PULSE-HEIGHT ANALYZER FOR PHYSIOLOGICAL RESEARCH.
Leo F. Walsh, William J. Mueller, and Robert J. O'Connell (N. Y., State U., Upstate Med. Center, Depts. of Bioelectron. and Computer Sci. and Physiol., Syracuse).
Journal of Applied Physiology, vol. 24, May 1968, p. 736–737. 6 refs.
Grants NIH GM-11413 and NIH NB-03904.

Linear and digital integrated circuits were used to construct an inexpensive pulse-height analyzer. The analyzer is used to separate multiunit extracellular activity of several physiological signal generators into four channels of amplitude-selected information. The instrument design allows full scale of operation with input signals in the 0–100 mv. range. The output is suitable for display on a 0 to 1-v. strip-chart recorder.

A68-81048
CONTINUOUS MEASUREMENT OF INTERNAL LEFT VENTRICULAR DIAMETER.
L. D. Horwitz, V. S. Bishop, H. L. Stone, and H. F. Stegall (USAF, School of Aerospace Med., Brooks AFB, Tex.).
Journal of Applied Physiology, vol. 24, May 1968, p. 738–740. 8 refs.

Continuous recordings of instantaneous internal left ventricular transverse diameters were obtained in conscious dogs with a sonomicrometer and transducers implanted inside the heart. The instrumented animals showed no cardiac embarrassment and gave reliable recordings for as long as seven wk. Measurements of internal ventricular diameter are preferable to those made with transducers affixed to the external surface of the heart because the interposition of the ventricular walls between external transducers precludes accurate determination of internal chamber dimensions. During isovolumic contraction internal diameter decreases, whereas external diameter reportedly increases. Differences between internal and external diameter measurements are probably due to thickening of the ventricular wall during systole.

A68-81049
REPEATED ITEMS AND DECAY IN MEMORY.
John Morton (Med. Res. Council, Appl. Psychol. Res. Unit, Cambridge, Great Britain).
Psychonomic Science, vol. 10, Feb. 25, 1968, p. 219–220. 6 refs.

Subjects were presented with a string of digits, following which they were required to judge which of two test digits occurred more recently in the list. As predicted by a trace-decay model, when the earlier of the test digits was repeated, performance was worse than in the control condition.

A68-81050
THE ELECTRORETINOGRAM, THE VISUAL EVOKED POTENTIAL, AND THE AREA-LUMINANCE RELATION.
John C. Armington (Northeastern U., Boston, Mass.).
Vision Research, vol. 8, Mar. 1968, p. 263–276. 28 refs.
Contract DA-49-193-MD-2978.

The area-luminance relation was investigated in a study of simultaneously recorded electroretinograms and evoked potentials. The stimulus was produced by a dark and white, striped grid which jumped back and forth within a circular field. This method reduced the effectiveness of stray light for producing uncontrolled response components. Large stimulus fields favored large responses at both recording sites, but to a degree which was greater for the electroretinogram. The results were interpreted in terms of the additivity of response and the distribution of retinal elements.

A68-81051
TRANSIENT AND STEADY STATE ELECTRORETINAL RESPONSES.
Lamberto Maffei and Richard E. Poppele (C.N.R., Ist. di Med. Sper., Sez. di Neurofisiol., Pisa, Italy).
Vision Research, vol. 8, Mar. 1968, p. 229–246. 24 refs.
Contract AF F 6 1052 67 C 0028.

Electroretinogram (ERG) activity recorded from the cat was analyzed for various states of dark adaptation and for different background levels in order to determine whether or not an equivalent background illumination, such as that detected with threshold data during dark adaptation, has the same effect in the retina as an actual background illumination. The frequency response characteristics of the ERG potentials were used as a quantitative indicator of the electrophysiological state of the elements of the retina. With this index, it was not possible to match the characteristics of any response occurring during the first six to eight min. of dark adaptation with those of a response obtained with greater than −0.2 Lux background. It was concluded that equivalent electrophysiological states do not exist in the retina in the two adaptation conditions.

A68-81052
ENDURANCE OF PREHEATED MEN IN EXHAUSTING WORK.

F. N. Craig and H. L. Froehlich (Edgewood Arsenal, Res. Labs., Md.).
Journal of Applied Physiology, vol. 24, May 1968, p. 636–639. 8 refs.

Four men walked to exhaustion up a grade beginning at 10% and increasing by 1% at the end of each min. In training at 18°C., the average endurance was 712 sec. In 18 tests at 46°C., the men were heated in a tub of water on different days to approximately 37.2, 37.8, 38.3, 38.9, and 39.2°C. before the walks. As the time in the bath increased from day to day, the heart rate and rectal temperature before the walk increased and walking time decreased. The shortest walk lasted 93 sec., the heart rate in the standing position before this walk was 177 beats/min. In standing, the heart rate increased with mean body temperature ($r = 0.88$). The walks shortened as the standing heart rate increased ($r = 0.90$). During the walks the heart rate increased without leveling off to a final average of 201 beats/min.; this did not vary significantly with walking time. The walking time was proportional to the difference between the final and standing heart rates ($r = 0.88$). The reduction in endurance associated with preheating was attributed to the narrowing of the margin available to the heart for an increase in rate.

A68-81053
EFFECT OF EXERCISE ON BLOOD VOLUME.
Lawrence B. Oscai, Ben T. Williams, and Bruce A. Hertig (Ill., U., Mercy Hosp., Dept. of Phys. Educ. and Dept. of Physiol. and Biophys., Urbana).
Journal of Applied Physiology, vol. 24, May 1968, p. 622–624. 11 refs.

The influence of regularly performed exercise on total blood volume (TBV) in 14 previously sedentary males aged 26–64 yr. was investigated. TBV, as estimated by means of radioiodinated (^{131}I) human serum albumin, increased 338 ml. ($P<0.05$) following 47 running sessions over a 16 wk. period. This 6% increase in TBV was due to an elevation in plasma volume; red cell volume did not change significantly. TBV did not change significantly in a sedentary control group. Maximal oxygen intake, used as an index of improvement in exercise capacity, increased 560 ml. (18%, $P<0.05$). It appears from these findings that exercise resulting in a significant increase in maximal oxygen intake is associated with an increase in TBV.

A68-81054
NUTRITIONAL EVALUATION OF BACTERIAL DIETS IN GROWING RATS.
Jacob Shapira and Adrian D. Mandel (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.).
Nature, vol. 217, Mar. 16, 1968, p. 1061–1062. 12 refs.

Rats were fed diets containing acetone-killed *Escherichia coli B* or *Hydrogenomonas eutropha* as a minimal nitrogen source, and diets which utilize these bacteria as the chief source of calories. In the experiment using *E. coli,* the hypothesis that diets containing very large amounts of bacteria are not harmful to the animals after they have been fed on the diets for 14 days was verified. When fed at a high level for a period of 26 days, *H. eutropha* did not seem to provide as good nutrition to weanling rats as a conventional protein. On the basis of these experiments, it was concluded that bacterial cells may be an adequate sole source of protein for extended periods when given at low levels in the diet.

A68-81055
ENERGY BALANCE AND BODY COMPOSITION CHANGES.
Francisco Grande (Minn., U., Lab. of Physiol. Hyg. and Mount Sinai Hosp., Jay Phillips Res. Lab., Minneapolis).
Annals of Internal Medicine, vol. 68, Feb. 1968, p. 467–480. 32 refs.

Comparison of the caloric value of the fat and protein lost to the body during starvation or food restriction with an estimate of the energy expenditure of the subject provides a simple way of detecting gross errors in body composition studies. Application of this criterion to the data of three recent reports showed very marked discrepancies between the caloric equivalent of the weight loss and the estimate of energy expenditure of the subjects. Further analysis of the original data is presented, and the various possible sources of error are discussed.

A68-81056
THE STUDY OF CALCIUM METABOLISM WITH RADIOACTIVE ISOTOPES. III. DETERMINATION OF DISTRIBUTION VOLUMES [DIE UNTERSUCHUNG DES KALZIUMSTOFFWECHSELS MIT RADIOAKTIVEN ISOTOPEN III. BESTIMMUNG DER VERTEILUNGSRAUME].
H. Sack.
Nuclear-Medizin, vol. 7, Dec. 30, 1967, p. 437–447. 19 refs. In German.

Determinations of the total calcium distribution volume were done in 75 patients without severe disorders of bone and calcium metabolism. After intravenous injection of ^{47}Ca and oral administration of ^{45}Ca, equal values were normally found if the extent of resorption was taken into account. The average value was 45.8 ± 15.6 l. so that there was a wide normal range. The study was based on a single-pool model in which equilibrium is reached within 24 and 48 hr., respectively. This value was compared with that calculated by using the seven hr. concentration of serum activity, the latter being 42.8 ± 14.5 l. and therefore slightly lower. For a rapid determination and as additional control of the normal method in doubtful cases this latter method appears to be appropriate.

A68-81057
INTERRELATIONSHIPS OF CIRCANNIAN RHYTHMS IN THE GROUND SQUIRREL, CITELLUS LATERALIS.
E. T. Pengelley (Calif., U., Dept. of Life Sci., Riverside).
Comparative Biochemistry and Physiology, vol. 24, Mar. 1968, p. 915–919. 12 refs.
Grant NSF GB-6179 and Riverside County Heart Assoc., Calif. supported research.

Experimental abolition, by food deprivation, of the body-weight circannian rhythm in *Citellus lateralis* did not prevent the onset of hibernation at the same time as in control animals. The experiment makes it necessary to modify a previous postulate that the attainment of a certain maximum body weight was a prerequisite to the onset of hibernation. By comparison with the data from circadian rhythms in other species and various theories concerning these, an attempt has been made to determine whether there is one master circannian clock with various manifestations, or two independent clocks which are normally phase-locked. It is argued that the available evidence suggests the latter.

A68-81058
PYRIDINE NUCLEOTIDE CHANGES DURING THERMOGENESIS IN BROWN FAT TISSUE IN VIVO.
S. Prusiner, J. R. Williamson, B. Chance, and B. M. Paddle (Pa., U., Johnson Res. Found., Philadelphia).
Archives of Biochemistry and Biophysics, vol. 123, Feb. 1968, p. 368–377. 46 refs.
Grants PHS 12202-03 and PHS 5-T5-GM; Am. Heart Assoc. supported research.

Studies were made on the interscapular brown fat of normal and arousing hamsters *in vivo* during the altered metabolism induced by hypoxia or infusion of norepinephrine. Ventilation of the lungs with nitrogen caused a prompt fall of the oxygen tension and temperature of the brown fat of normal hamsters. This was followed by an increase of fluorescence, which started when the

tissue oxygen tension fell to a critical level. The oxygen tension of brown fat from arousing hamsters was one third that of normal hamsters, an indication of a more active metabolic state of the tissue during arousal. With arousing hamsters, the fluorescence level increased immediately after N_2 inhalation, and the brown-fat temperature decreased. Norepinephrine infusion into the external jugular vein produced a prompt decrease of fluoresence and oxygen tension, and an increase of temperature in the brown fat of normal and arousing hamsters. The pyridine nucleotide fluorescence response is considered to reflect redox changes of the mitochondrial NAD^+ system. Since enhanced thermogenesis coincided with an increased flow of electrons through the respiratory chain and an oxidation of the pryidine nucleotides, it is deduced that the mitochondria of brown fat *in vivo* are capable of oxidative phosphorylation. A theory for the chemical mechanism of thermogenesis is developed which suggests that heat production is controlled by the rate of respiration. Hydrolysis of triglyceride, through norepinephrine mediation, provides the respiratory fuel, while other mechanisms sustain the supply of phosphate acceptor to the mitochondria.

A68-81059
INTERACTIONS BETWEEN PHOTOSYNTHESIS AND RESPIRATION IN CHLORELLA. I. TYPES OF TRANSIENTS OF OXYGEN EXCHANGE AFTER SHORT LIGHT EXPOSURES.

August Ried (Carnegie Institution of Wash., Dept. of Plant Biol., Stanford, Calif.).

Biochimica et Biophysica Acta, vol. 153, Apr. 2, 1968, p. 653–663. 25 refs.
Charles F. Kettering Found. and Carnegie Institution of Wash. supported research.

Synchronous *Chlorella fusca* was exposed to light for periods of 0.1 sec. to 15 min. Subsequent to the illumination, the rate of O_2 exchange passes through a series of transient phenomena. These transients vary greatly with cellular age and depend also upon conditions prior to and during the experiment. However, the individual maxima and minima of O_2 exchange specified as T_1, T_2, T_3... occur at reproducible times provided that algae of the same developmental stage and pretreatment are used. At least five individual components are involved in the complex changes: (a) a sudden photosynthetic O_2 evolution (T_1) which, after darkening, declines rapidly and without oscillations; (b) a brief and distinct O_2 uptake (T_2) immediately after switching off the light, which is only observed under special conditions; (c) the next maxima and minima T_3, T_4, T_5, and partly also T_6 obviously are damped oscillations of the respiratory O_2 uptake, started by an inhibition of some respiratory step by photosynthesis; (d) a slow declining stimulation of O_2 uptake superimposed on the foregoing transients occurs after longer light exposures; and (e) a very strong stimulation of respiratory O_2 consumption (T_8), culminating not until six to eight min. after the start of illumination, is induced only by irradiation with short-wave light (<540 nm.) after longer dark periods. The individual components differ with respect to their dependence on intensity, wavelength and duration of the light exposure and their sensitivity to several inhibitors. According to their characteristics all transients except T_8 depend on, but in different ways, the function of the photosynthetic apparatus. The components b and c seem to be closely connected with System I.

A68-81060
ON THE QUESTION OF GENERALLY VALID RULES FOR THE CONFORMITY OF CIRCADIAN RHYTHM [ZUR FRAGE DER ALLGEMEINGULTIGKEIT CIRCADIANER GESETZMASSIGKEITEN].

Ludger Rensing and Wolfgang Brunken (Göttingen U., I. Zool. Inst., West Germany).

Biologisches Zentralblatt, vol. 86, Sep.–Oct. 1967, p. 545–565. 94 refs. In German.

The "Circadian Rule" set up by previous investigators maintains in its empirical form that the parameters of the circadian oscillation, i.e. frequency, amount of activity and α/ρ-ratio (proportion of activity-to rest time) change in the same way depending on the light intensity. As this rule is based mainly on evidence found in vertebrates, in particular birds and mammals, the question arises whether differently organized phyla behave the same way. A summary of the available material on arthropods with emphasis on some recent papers showed no correlation in arthropods of the parameters frequency, amount of activity and α/ρ-ratio under varying constant light conditions. This deviating behavior might be explained by the varying degree in which different levels of organization participate in the perception and processing of those stimuli which are relevant for the circadian system. The formulation of generally valid rules for circadian rhythms on a theoretical level will be possible only if the complex relations between stimulus and reaction at the different levels of organization and their connections with endogenous processes can be taken into account.

A68-81061
ON-LINE PARAMETRIC FUNCTION DISPLAY.

J. A. J. Stolwijk, H. Graichen, and A. Bouhuys (John B. Pierce Found. Lab. and Yale U., School of Med., Dept. of Epidemiol. and Public Health, New Haven, Conn.).

Journal of Applied Physiology, vol. 24, May 1968, p. 715–716.
Grants PHS UI 435 and PHS AP 00463.

A solid-state pulse-generating circuit which modulates the Z axis of XY oscilloscope can be used to plot a Y variable as a function of an X variable, with a third variable as the parameter. The device has been useful in studying the relations between lung inflation, esophageal pressure, and airflow rate in man.

A68-81062
MAGNESIUM PEMOLINE: EFFECTS ON DRL PERFORMANCE.

Yasuko Filby and Lucille Frank (Creedmoor Inst. for Psychobiol. Studies, Queens Village, N. Y.).

Psychonomic Science, vol. 10, Mar. 5, 1968, p. 265–266. 9 refs.

Magnesium pemoline (MgPe) has been found to facilitate avoidance performance. Several workers have suggested that this facilitation is due to drug-induced increases in motor activity and sustained responsivity to the warning stimulus and not to an enhancement of central associative mechanisms. The performance was compared of rats given 5, 10, 20, 40 mg./kg. MgPe or a control solution in a differential reinforcement of low rate (drl) situation where increases in motor activity or stimulus responsivity would not necessarily facilitate performance whereas an improvement in central associative processes would. Results showed that MgPe did not facilitate, but at higher doses impaired, drl performance.

A68-81063
MEDICAL ASPECTS OF MIXING OXYGEN WITH AIR FOR DIVERS [MEDICINSKA SYNPUNKTER PÅ SYRGASTILLBLANDNING I DYKLUFT].

Ulf Balldin (Fysiol. Inst., Flyg- och Navalmed. Lab., Lund, Sweden).

Försvarsmedicin, vol. 4, Jan. 1968, p. 12–18, iii-v. 24 refs. In Swedish.

The literature on oxygen poisoning was examined in order to reduce the risk of decompression sickness and to facilitate treatment of any cases of this disease in divers using oxygen-air mixtures. Symptoms of decompression sickness were given. The chemical mechanism of oxygen poisoning was shown to be intimately

associated with the inactivation of certain enzyme systems. A number of substances were found to have a protective effect in oxygen poisoning, but no antidote can be recommended for routine use in diving work. The risk of oxygen poisoning is enhanced if air is supplied at constant oxygen pressure, and the narcotic effect of nitrogen is increased if oxygen is added to air, especially when the nitrogen pressure is high. There is a more pronounced disposition to oxygen poisoning when working in water than in a dry pressure chamber, and this should be taken into account in diving activities. The greater density of oxygen as compared with nitrogen increases the tendency to turbulence and to greater air resistance and thus causes more respiratory work. Psychological studies showed that subject's ability to perform psychomotor functions deteriorates when oxygen is mixed with air. It is evident that if an amount of oxygen is mixed with air for divers which is sufficient to have a practical effect on decompression sickness, then, at the same time, greater risks are incurred. Consequently, for the present the procedure cannot be recommended.

A68-81064
CHANGES IN THE NECK PART OF THE VERTEBRAL COLUMN DURING VERTICAL STRESS [VERANDERUNGEN IM HALSTEIL DER WIRBELSAULE BEI VERTIKALER BELASTUNG].
W. Wassilev (Lehrstuhl für Anat., Med. Inst., Sofia, Bulgaria).
Anatomischer Anzeiger, vol. 121, no. 5, 1967, p. 453–467. 16 refs. In German.

The variations in cervical vertebrae and disks subjected to various amounts of static and dynamic loads were examined roetgenologically, microscopically and macroscopically. Vertical compression exerted in healthy disk preparations caused a tangential shift of the uncinatum process to the upper vertebral body, thus increasing the diameters. Degenerate disks reacted insignificantly to applied loads. During greater loads or repeatedly applied impacts, destruction occurred in the lateral disk component, the incinatum process. The concept of secondary characteristics of the unco-vertibral cavity was supported through the determination of ruptures in the lateral disk regions. All compression fractures of the cervical vertebrae were accompanied by disk damage. Front disk hernias in the cervical region were common. They did not directly affect the tissue, but caused irregular distributions of force and abnormal mobility.

A68-81065
A MATHEMATICAL MODEL FOR THE BATCH REACTOR KINETICS OF ALGAE GROWTH.
Francis P. Ragonese and John A. Williams (Northeastern U., Dept. of Chem. Eng., Boston, Mass.).
Biotechnology and Bioengineering, vol. 10, Jan. 1968, p. 83–88. 11 refs.

A mathematical model based on the Einstein law of photochemical equivalence is proposed to describe the batch growth of unicellular algae. The model was applied in an integrated form to cell concentration versus growth time data taken over an extended range of cell concentrations which include both the regions of "exponential" and "linear" growth. It is shown that a certain function of cell concentration contained in the integrated form of the model is linearly dependent on the growth time over both the "exponential" and "linear" growth regions.

A68-81066
THE EFFECT OF HYPOXIA ON COLONY-FORMING UNITS IN BONE MARROW.
W. Fried, M. Weisman, D. Martinson, and C. W. Gurney (Ill., U., Coll. of Med., Dept. of Med. and Veterans Admin. West Side Hosp., Chicago; Chicago, U., School of Med., Dept. of Med. and Argonne Cancer Res. Hosp., Chicago; and Rutgers Med. School, Dept. of Med., New Brunswick, N. J.).
(Bone Marrow Conf., Atlantic City, Apr. 1966).
Journal of Laboratory and Clinical Medicine, vol. 71, Mar. 1968, p. 422–428. 14 refs.
Veterans Admin. Res. Funds and Am. Cancer Soc. supported research.

Prolonged exposure to hypoxia does not result in a decrease in the number of colony-forming units in a leg. The colony-forming units do, however, become significantly more sensitive to the damaging effects of X-irradiation after three days of hypoxia. We suggest that elevated erythropoietin levels result in an increase rate of erythropoiesis. This, in turn, either directly or indirectly, stimulates multipotential stem cells to differentiate. To prevent a decrease in the pool of undifferentiated cells, the remaining ones are stimulated to proliferate more rapidly. Rapidly proliferating cells are, in turn, more radiosensitive.

A68-81067
REFRACTORINESS IN INFORMATION PROCESSING.
L. H. Shaffer (Exeter, U., Dept. of Psychol., Great Britain).
Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 38–50. 18 refs.

Two experiments on refractoriness were carried out in which the warning, first and second signals, S_0, S_1 and S_2 respectively, were all single-valued, and the distributions of random intervals between S_0 and S_1 and S_2 were the same. In the first experiment the intervals in a trial were statistically independent: the null hypothesis, that the latencies of the two responses would be similar, was rejected, but the results were also found to agree with no existing alternative hypothesis. In the second experiment the intervals in a trial were conditionally related and the second response was found to be faster than in the first experiment. This is discussed in the context of the issue of serial or parallel processing of information.

A68-81068
ULTRAVIOLET IRRADIATION IN MEDICINE: OPHTHALMOLOGIC ASPECTS.
John A. Buesseler.
Missouri Medicine, vol. 65, Apr. 1968, p. 293–296. 14 refs.

The biological effects of ultraviolet radiation were reviewed. Although the beneficial effects of sunlight have been appreciated by man since early recorded time, fruitful efforts at studying the physical and biological effects of ultraviolet radiation data from the late 19th century. Ultraviolet radiant energy exerts its biological effect by absorption into the intramolecular periodic system of the exposed tissues producing a photochemical denaturation of proteins which can result in an abiotic lesion. The typical clinical reaction appears after a latent period of generally six to eight hr. and is characteristically manifested by the development of erythema and pain. Photo-ophthalmia induced by ultraviolet radiation consists of punctate erosions of the epithelium of the exposed cornea and conjunctiva. It is accompanied by marked photophobia, ciliary spasm and blepharospasm. The symptoms are severe and incapacitating at the time, but the injury seldom results in permanent disability.

A68-81069
VIBRATION AND DRIVERS' VISION.
J. B. Davey.
Ophthalmic Optician, vol. 8, Mar. 16, 1968, p. 297.

A study of the effects of continuing vibration was presented. Measurements were made, both before and after a period of vibration, of visual acuity, tapping rate, binocular depth perception, mental addition and hand reaction time. Detrimental effects were

noted. It was also noted that visual acuity decreases both during and after vibration.

A68-81070
GAIT PATTERNS AND THE SPEED OF WALKING.
D. W. Grieve (Med. Res. Council (Hampstead Labs.), Human Biomech. Lab., London, Great Britain).
("Human Body Dyn. and its Appl. in Prosthetics and Orthotics," Symp., Dundee, Jun. 1967).
Bio-medical Engineering, vol. 3, Mar. 1968, p. 119–122.

New perspectives of the human walking mechanism were discussed, and a new technique for the presentation of angular movements was introduced. Measurements were made of stride length, speed, cycle time, time of swing and angulation of the lower limb. Data were analyzed mathematically. Results showed a continuum of movement patterns reflecting the versatility of the walking mechanism. The clinical importance of these studies was noted.

A68-81071
DAMAGE TO CELLS BY IONIZING RADIATIONS.
R. Rugh (Columbia U., Coll. of Physicians and Surgeons, Dept. of Radiol., Radiol. Res. Lab., New York, N. Y.).
Atompraxis, vol. 14, no. 1, 1968, p. 13–17. 9 refs.

Ionizing radiations have their effects at ultra-microscopic physico-chemical levels which can manifest themselves at the cellular level. The effects of irradiation on the cell can be lethal via various routes, or can be sub-lethal, depending upon the specific radiosensitivity of the particular cell and the number of absorbed ionizations. In the sub-lethal situation the cell can survive, propagate, and give rise to anomalies or malignancies. The latent period for cell damage by irradiation may be from minutes to decades, depending largely upon the survival of the insult and the rate of propagation of the damaged cell. There is reason to believe that most of the mental disorders which have a genetic basis could be produced by inoizing radiations to the early embryo or to the germ cells because of the effect of ionization on the genes and chromosomes. Ionizing radiations are probably never beneficial to the individual cell where abosrption of ions takes place. The cells most seriously affected by ionizing radiations are those of the embryo, and those of the gonads which perpetuate the effects of such insult, which are particularly radiosensitive. In spite of the caution expressed regarding embryonic and gonadal exposure, there should be no hesitancy in using medically prescribed X-rays in the process of diagnosis or therapy in the treatment of disease. However, in radiological practice the cells of the embryo and of the gonads should be shielded if possible.

A68-81072
THE PSYCHOLOGICAL EFFECTS OF 205 HOURS OF SLEEP DEPRIVATION.
Robert O. Pasnau, Paul Naitoh, Serena Stier, and Edward J. Kollar (Calif., U., School of Med., Neuropsychiat. Inst., Los Angeles).
Archives of General Psychiatry, vol. 18, Apr. 1968, p. 496–505. 28 refs.
Grant NIMH MH-08441.

Four healthy young adult men were studied continuously during 205 hr. of sleep deprivation. The subjects quickly formed a group and manifested many of the dynamics described for groups attempting to adapt to stressful environments. Subjects experienced a gradual increase in fatigue and a decline in perceptual, cognitive, and psychomotor capabilities with transient ego disruptive symptoms as reported in previous studies. After the fifth day of deprivation, they seemed to get a "second wind" which has been described as the "fifth day turning point" by other observers. They experienced increasing moments or lapses during which there was a deterioration in performance, increase in misperceptions, hallucinations, lability of affect, and regressive behavior. However, in spite of these lapses and increasing fatigue, they were able to rouse themselves to perform tasks and in the intervals between lapses perceptual functions, thought processing and general intellectual capabilities remained intact. No evidence was found to support the claims of others that there is a psychosis of sleep deprivation. It was also concluded that sleep deprivation *per se* is unable to produce psychopathological reactions which extend beyond the period of sleep deprivation.

A68-81073
NUTRITIONAL AND HORMONAL FACTORS CONCERNED WITH THE REGULATION OF LIVER PROTEIN SYNTHESIS DURING ACUTE CENTRIFUGATION STRESS.
H. A. Leon and M. J. Chackerian (NASA, Ames Res. Center, Biotechnol. Div., Moffett Field, Calif.).
Endocrinology, vol. 82, Mar. 1968, p. 429–435. 16 refs.

Experiments were made to determine the requirements for the stimulation of amino acid incorporation seen in liver preparations from intact, adrenalectomized and hypophysectomized fasted rats following three hr. of centrifugation at 4.7 ×g. In preparations from fed rats, incorporation of valine-1-^{14}C into cell-sap protein decreased 42 and 27% in intact and hypophysectomized rats, respectively, following centrifugation. Microsomal incorporation rates were similarly affected but to a lesser extent. However, no change in incorporation rate was observed in similarly obtained preparations from fed adrenalectomized rats. Preparations from both fed and fasted diabetic rats showed significant decreases in incorporation following centrifugation. In the fed group, cell-sap incorporation decreased 42%, whereas in the fasted diabetic rats it decreased 67%. In fasted diabetic rats, this decrease could be alleviated or prevented by the injection of insulin just prior to centrifugation. The extent to which control levels of incorporation were restored depended on the amount of insulin injected. A fatal hypoglycemia in these fasted diabetic rats resulting from the insulin injection was prevented by the hyperglycemia inducing action of centrifugation *per se*. Increases in plasma glucose were observed in the fasted groups that previously showed a stimulation of incorporation following centrifugation. In consideration of previous results, fasting appears to be a precondition for the stimulation of incorporation. It is further suggested that insulin normally released during hyperglycemia is mainly responsible for the stimulation, although the concomitant rise in blood sugar may, in itself, be a requirement. The decrease in the incorporation rate seen in some of the red groups subsequent to the stress is tentatively attributed to an action of the adrenal medulla. This is based on the observation that in corresponding groups removal of the adrenal gland eliminates the depression, whereas in hypophysectomized rats that still have a functional adrenal medulla the depression of incorporation persists.

A68-81074
A FOOTREST-LEG EXERCISE DEVICE FOR LONG-TERM RESTRAINT STUDIES WITH PRIMATES.
Robert G. Braun, Thomas L. Wolfle, and John A. Chisum (Holloman AFB, N. Mex.).
Journal of the Experimental Analysis of Behavior, vol. 11, Jan. 1968, p. 69.

A combined footrest-leg exercise springboard was described that enables animals to exercise their legs isotonically against pressure during studies requiring continuous restraint. From the result it was concluded that restraint periods in excess of 35 days, using the exercise device, will not produce the pathological symptoms that occur during trials in which the animals do not exercise.

A68-81075
STERILIZATION WITH GASEOUS ETHYLENE OXIDE: A REVIEW OF CHEMICAL AND PHYSICAL FACTORS.
Robert R. Ernst and John E. Doyle (Castle Co., Res. Lab., Rochester, N. Y.).
Biotechnology and Bioengineering, vol. 10, Jan. 1968, p. 1–31. 14 refs.

Although the basic parameters for ethylene oxide sterilization are established, it is sometimes difficult to attain in practice where the principal limiting factor is moisture availability. There are situations which can limit or enchance the dynamics of sterilization. Such factors, if overlooked, could upset experiments and lead to erroneous conclusions, or defeat the sterilization process entirely. Such are, namely: stratification effects, diffusion barriers, moisture-reducing effects, polymerization, and temperature distribution gradients.

A68-81076
EFFECTS OF SENSORY DEPRIVATION AND HYDROXYZINE ON RATS' BAR PRESSING.
Vladimir Pishkin, Elizabeth A. Rasmussen (Okla., U., School of Med. and Veterans Admin. Hosp., Oklahoma City), and Carla R. Duke (Vassar Coll., Poughkeepsie, N. Y.).
Psychonomic Science, vol. 10, Mar. 5, 1968, p. 255–256. 5 refs.
VA Med. Res. Funds supported research.

Female albino rats were used in this experiment designed to study the effects of hydroxyzine on operant behavior following 24 hr. of sensory deprivation (SD). A significant drug effect was demonstrated, but no significant degree of inhibition upon the number of bar presses, nor any of the interaction effects resulted from SD. The inconsistency of these results with earlier studies was discussed.

A68-81077
S-R SEPARATION WITH MONKEYS.
Douglas L. Medin (S. Dak., U., Vermillion).
Psychonomic Science, vol. 10, Mar. 5, 1968, p. 247–248. 8 refs.
Grant PHS MH-07147-04.

Four monkeys were tested on successive problems involving cue-response separations. The usual AA go left/BB go right paradigm was altered by introducing neutral (N) stimuli in place of one of the As or Bs to create NA, AN, BN, and NB configurations. The neutral stimulus created cue-response separations equal to the foodwell separation in two of the configurations (NA, and BN, where A signals go left and B signals go right). Three of the four monkeys were able to solve these cue-response separation problems. Performance was discussed in terms of observing response theory and with respect to differences between the simultaneous and successive problem paradigms.

A68-81078
THE EFFECT OF STIMULUS AMPLITUDE ON THE THRESHOLD OF FUSION OF OF PAIRED FLASHES.
P. H. Venables and L. A. Warwick-Evans (Birkbeck Coll., Dept. of Psychol., London, Great Britain).
Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 30–37. 17 refs.
Med. Res. Council supported research.

Four experiments are descirbed in which the threshold of fusion of paired flashes was measured. The intensity of the single flashes making up the pairs was varied independently. The results showed that when the first flash of the pair was the more intense, the threshold of fusion increased linearly as the difference in the log intensity of the two flashes. A proposal put forward to explain the results suggested the "noise" created by the first flash of the pair has to dissipate to a critical extent to allow the "signal" arising from the second flash to be detected.

A68-81079
NERVE CONDUCTION VELOCITIES IN FASTING PATIENTS.
Richard H. Mattson and Frank R. Lococq (Aerospace Med. Div. (AFSC), Wilford Hall USAF Hosp., Dept. of Med., Neurol. Serv. and Endocrine-Metab. Sect., Lackland AFB, Tex.).
Neurology, vol. 18, Apr. 1968, p. 335–339. 18 refs.

Motor nerve conduction velocities were measured in the peroneal, median, and ulnar nerves of 25 patients before and upon completion of a fast of 14 to 28 days' duration. The mean conduction velocities and the range of values showed no statistically significant change. However, six patients noted paresthesias and one of these had a frank foot drop. The study emphasized also that evaluation of conduction velocity changes in "before and after" studies should take into account the fact that the values might vary occasionally as much as ten m./sec. because of the limitations inherent in the technique.

A68-81080
BAD NEWS FOR ASTRONAUTS.
Charles Marwick.
New Scientist, vol. 37, Feb. 29, 1968, p. 462–463.

Experiments of Biosatellite II involving both lower plants and animals were summarized. The effects of radiation and weightlessness on growth and heredity were the major concerns of the investigations. Preliminary results indicated a magnification of radiation effects due to the weightlessness experienced in space. These findings may indicate that present levels of radiation protection in manned space flights are insufficient.

A68-81081
INVESTIGATIONS CONCERNING THE DEPENDENCE OF THE PERCEPTUAL THRESHOLD FOR COMPLEX VISUAL PATTERNS ON THE PARAMETERS OF TIME, INTENSITY AND FORM [UNTERSUCHUNGEN UBER DIE ABHANGIGKEIT DER WAHRNEHMUNGSSCHWELLE FUR KOMPLEXE SEHZEICHEN VON DEN PARAMETERN ZEIT, INTENSITAT UND FORM].
Helmut von Benda (Munich, Tech. Hochschule, Inst. für Ergonomie, West Germany).
Psychologische Beiträge, vol. 10, First quarter, 1968, p. 236–304. 387 refs. In German.
German Research Soc. supported research.

The literature of the interpretation and additional methods of later contributions describing experiments for pattern perception was reviewed. Departure from the description theories of gestalt psychology were outlined from experiments of other workers. A casual model illustrating the brain processes which are the basis for pattern perception was given. A review of the research in the field of automatic signal detection of models was also given. Data on the role of the ontogenetic development of pattern preception, results of experiments with homogeneous whole fields and stabilized retinal images, and new electrophysiological investigations were reported. One section was devoted to the literature concerning the Bunsen–Roscoe law. In a section of methods a review of the relevant work of the quantification of forms and the concept of pattern threshold was given. Conclusions were discussed in view of the information theory and of the specific structural characteristics of signals.

A68-81082
ALCOHOL METABOLISM IN MAN: ACUTE EFFECTS OF PHYSICAL EXERCISE, CAFFEINE, FRUCTOSE, AND GLUCOSE ON THE RATE OF ETHANOL METABOLISM.
G. L. S. Pawan (Middlesex Hosp., Med. Unit, London, Great Britain).
Biochemical Journal, vol. 106, Jan. 1968, p. 19P. 7 refs.

A68-81083

The factors which might alter ethanol metabolism in human subjects was investigated. After an overnight fast 12 normal men (age 21 to 46 yr.) were given a standard dose of ethanol at least three times at intervals of three to five days. Ethanol concentrations in blood and urine were plotted against time, the slope of the rectilinear curve taken as a measure of the rate of alcohol metabolism. The slopes of the curves were relatively constant for all subjects but one. There was no change in alcohol metabolism when the experiment was followed by fairly intensive exercise or when the subjects were given strong black unsweetened coffee plus 50 mg. of oral caffein. The rate of alcohol elimination increased significantly in some of the subjects after they were given 30 g. of fructose in lemon juice, the substitution of fructose by glucose produced no effect on alcohol metabolism.

A68-81083
VOLUNTARY ATTENTION IN PERIPHERAL VISION AND ITS EFFECTS ON ACUITY AND DIFFERENTIAL THRESHOLDS.

G. C. Grindley and Valerie Townsend (Psychol. Lab., Cambridge, Great Britain).

Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 11–19. 12 refs.

Med. Res. Council supported research.

The three experiments described in this paper were intended to show whether voluntary attention to a particular part of the peripheral visual field had any effect on the accuracy of the subject's perception. Test objects near to threshold value (for acuity or for changes in luminance) were used. The experiments were also designed to study the possible distracting effect of other stimuli presented simultaneously in different parts of the field. In Experiment I the subject could be given foreknowledge of the position in which an acuity test object would appear. In Experiment II the signal of where to attend was given simultaneously with the exposure of an acuity test object. In Experiment III differential thresholds for luminance were investigated by methods similar to those used in Experiment II. It was found in all these cases that the instructions to attend to a particular part of the peripheral field had no significant effect on perception unless there were simultaneously exposed "competing" stimuli in other parts of the field. The results support the view that, in peripheral vision, attention acts selectively on the immediate memory trace only when there is a complex pattern of stimulation.

A68-81084
ASYMMETRIES OF PATTERN PERCEPTION OBSERVED IN ISRAELIS.

Lila Ghent Braine (George Washington U. and Wash. School of Psychiat., Washington, D. C.).

Neuropsychologia, vol. 6, Mar. 1968, p. 73–88. 23 refs.

Contracts DA-49-193-MD-2826 and DA-49-193-MD-2100.

When a visual pattern extends across fixation into both fields, American college students identify the part on the left side better than the part on the right. This effect has been attributed to reading habits, which predispose the subject to scan from left to right. This interpretation was tested by investigating Israelis, who read from right to left. Surprisingly, the Israeli students also showed greater accuracy for the left visual field and tended to organize a series of items from left to right. Investigation of Israeli children suggested that the left "attentiveness" began around the seventh grade, and developed from an earlier tendency to "attend" to the right. These asymmetries are not due primarily to reading habits, nor to field differences related to hemisphere specilization; a third interpretation is discussed.

A68-81085
RESISTANCE TO EXTINCTION AS A FUNCTION OF NONRESPONSE INCENTIVE SHIFT.

D. Gene Davenport and John H. Mueller (St. Louis U., Mo.).

Psychonomic Science, vol. 10, Mar. 5, 1968, p. 243–244. 5 refs.

NASA Grant NsG(T)-74, Suppl. no. 3.

Rats were given 50 direct placements in the goalbox following 50 acquisition trials in the complete runway. Extinction performance was found related to reward levels in both placement and acquisition, with the larger reward less resistant.

A68-81086
POST-FLIGHT CHEST DISCOMFORT IN FIGHTER PILOTS.

B. C. R. Strömblad, (Försökscentralen, Flygmed. Inst., Malmslätt, Sweden).

Försvarsmedicin, vol. 4, Jan. 1968, p. 3–7. 11 refs.

When pure oxygen is breathed during flight the pilot may experience a respiratory syndrome characterized by chest-pain, cough and difficulties in taking a deep breath. The addition of air (air-mix) to the breathing gas largely prevents the symptoms and the concomitant decrease in vital capacity. An air-mix facility has been provided by the AGA company for use with the AGA oxygen regulator. As part of the testing program the vital capacity before and after flight with and without the air-mix was estimated. The flights were either aerobatic or quiet flights at a cabin height of 1,000 to 3,500 m. It was found that aerobatic flights with pure oxygen administered caused a decrease of vital capacity to 73% of the starting value, while a value of 93% was obtained when the air-mix was used. Quiet flying with pure oxygen caused a decrease of 94% of the preflight value.

A68-81087
ACOUSTIC FACTORS IN VISUAL SEARCH.

D. W. J. Corcoran and D. L. Weening (U.S. Navy Electron. Lab, Center, San Diego and San Diego State Coll., Calif.).

Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 83–85.

Previous work has shown that in searching for existing or absent "e.s." in printed prose, the presence or absence of silent "e.s" was less likely to be detected than that of pronounced "e.s." It was suggested that the acoustic or kinesthetic "image" was searched for evidence of an "e" in addition to the visual stimulus and that evidence from both sources was considered in making the appropirate response. The present experiment employs mainly substitutive errors within words, which may or may not change their pronounciation. The results suggest that the form of the acoustic correlates has no bearing upon whether the words are detected as wrongly spelled, but that the presence or absence of an acoustic event corresponding in time to the spatial location of the error is important.

A68-81088
DISCRIMINABILITY AND CENTRAL INTERMITTENCY IN SAME–DIFFERENT JUDGEMENTS.

Michael C. Corballis, William Lieberman, and Dalbir Bindra (McGill U., Dept. of Psychol., Montreal, Canada).

Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 51–61. 9 refs.

Contract Nonr-4896(00) and DRB, Canada supported research.

Four sets of paired visual stimuli (OO, XX, XO, or OX) were judged by 48 subjects to be either "same" or "different." Decision latencies of the same and different judgment were studied as a function of the inter-stimulus interval (ISI). In Experiments I and II, in which stimulus durations were 70 msec., decision latencies showed marked increases when the ISI was reduced to 100 msec., but in Experiments III and IV, in which the stimulus durations were only 40 msec., comparable increases did not occur

until the ISI was reduced to 50 msec. These increases were more marked for "same" than for "different" judgments, although overall decision latencies were generally shorter for "same" judgments. The effects of varying ISIs and stimulus durations are interpreted in terms of masking; they fail to support an hypothesis of central intermittency.

A68-81089
TONIC AND PHASIC INFLUENCES OF SLEEP UPON THE VISUAL PATHWAY [INFLUENCES TONIQUES ET PHASIQUES EXERCEES PAR LE SOMMEIL SUR L'ACTIVITE DE LA VOIE VISUELLE].

O. Benoit (Centre de Rech. Neurophysiol., Inst. Natl. de la Santé et Rech. Méd., Hop. de la Salpetrière, Paris, France).

Journal de Physiologie, vol. 59, Jul.–Aug. 1967, p. 295–317. 72 refs. In French.

In 12 cats with indwelling electrodes the tonic and phasic influences produced by sleep on spontaneous unitary activity of the optic nerve and the lateral geniculate body (LGB), and on the thalamocortical activity evoked by electrical stimulation of the optic nerve were studied. In the optic nerve the level of spontaneous neuronal discharge was minimal during slow wave sleep. It increased progressively in sleep with rapid eye movements (REM), but remained lower than during wakefulness. In the LGB, different levels of tonic spontaneous activity should be distinguished. Unitary activity was minimal during slow wave sleep, but was high during REM and wakefulness. The amplitudes of the different components of cortical potentials evoked by optic nerve stimulation were variable. Responses were minimal during slow wave sleep, and increased slightly more during REM than during quiet wakefulness. The phasic phenomena occurring in the LGB during slow wave sleep and REM, activated thalamic and cortical neurons and facilitated transmission of the responses. In the reserpine-treated animal stimulation of the optic nerve at 30/sec. demonstrated the co-existence of a fall in amplitude of the presynaptic component in the LGB, and facilitation of postsynaptic thalamic and cortical components during phasic activity.

A68-81090
JET PERCEPTION.

Stanley Mohler and S. J. Gerathewohl.

FAA Aviation News, vol. 6, Mar. 1968, p. 4–5.

Physical qualifications and visual standards for pilots were discussed in relation to jet aircraft, and suggestions were made for best visual adaptation to flying high performance planes in pilots switching over from piston aircraft.

A68-81091
BIOCHEMICAL INVESTIGATIONS IN CHRONIC BERYLLIOSIS [BIOKHIMICHESKIE ISSLEDOVANIIA PRI KHRONICHESKOM BERILLIOZE].

P. A. Rozenberg and A. A. Orlova (USSR, Acad. of Med. Sci., Inst. of Prof. Hyg. and Prof. Diseases, Moscow).

Gigiena Truda i Professional'nye Zabolevaniia, vol. 11, Dec. 1967, p. 33–37. 9 refs. In Russian.

The paper reports on biochemical analyses carried out in 77 persons who had been exposed to the effects of beryllium, beryllium oxide and beryllium bronze. The persons examined had ceased handling these substances as long ago as three to 15 yr. Persons who showed no clinical and roentgenological symptoms of the disease, but had been exposed to the effects of beryllium and its compounds exposed group, as well as a number of patients suffering from chronic berylliosis were found to have altered oxidation processes. This change was characterized by an increased rate of acid production, of amino acids excretion in the urine and reduced amount of sulfhydryl groups in the blood serum. In berylliosis patients the activity of the blood serum alkaline phosphatase was higher than in subjects of the exposed and control groups.

A68-81092
THE EFFECT OF GASOLINE FUMES ON THE GENITAL FUNCTIONS OF ALBINO RATS [O VLIIANII PAROV BENZINA NA DETORODNUIU FUNKTSIIU BELYKH KRYS].

V. G. Matysiak (Sanit.-Hyg. Med. Inst., Leningrad, USSR).

Gigiena Truda i Professional'nye Zabolevaniia, vol. 11, Dec. 1967, p. 37–41. In Russian.

So far there is much to be studied as to the influence exerted by gasoline fumes on specific functions of the female organism. The author has set for himself a task to study the function of conception, fertility and uterine development of fetuses in albino rats exposed to chronic gasoline poisoning. A total of five series of tests were set up using 58 rats. Chronic poisoning was continued for three and one-half mo. with a daily four-hr. long exposure. Experiments demonstrated that long-term exposure of rats to the effect of gasoline fumes elicited changes in the genital function of animals manifesting itself in reduced fertility and abnormal uterine development of the fetuses.

A68-81093
EVIDENCE FOR STRETCH RECEPTORS IN PULMONARY BLOOD VESSELS.

R. Viswanathan (Delhi, U., V. P. Chest Inst., India).

Indian Journal of Medical Research, vol. 60, Sep. 1967, p. 965–972.

Sixty-three patients were studied with a view to confirming previous observations that pulmonary arterial pressures are consistently raised immediately after blocking any one of the pulmonary arteries on their branches. The analysis of the present data confirmed that there was consistent rise in the pulmonary artery pressure as a result of stretching any one of the arterial branches by a balloon. There was significant zonal variation in response to blocking in the pulmonary artery. The slightly higher rise in the Mid-zone, however, requires further confirmation as the number of mid-zones studies were small. The rise in pressure during blocking was directly related to the initial pulmonary artery pressure. The significance of this is unclear. It may, however, be due to increase of musculature in the pulmonary arterioles of those with pulmonary hypertension.

A68-81094
CROSS-MODAL INDUCTION OF CHANGES IN SENSORY THRESHOLDS.

Gail R. Hardy and D. Legge (London, U. Coll., Dept. of Psychol., Great Britain).

Quarterly Journal of Experimental Psychology, vol. 20, part 1, Feb. 1968, p. 20–29. 22 refs.

Two experiments are reported in which subliminal stimulation of one modality with emotional material impairs detection performance in a different modality. In the first experiment the visual awareness threshold for neutral material was raised by simultaneous auditory presentation of emotional words. This result supports the hypothesis that threshold changes induced by emotional stimulation are mediated centrally. In the second experiment a similar effect was obtained when the experimental roles of the two modalities were reversed. An analysis of the effect in terms of the parameters of Signal Detectability Theory indicates that it is mediated by a lowering of the sensitivity of the detection mechanism. This may be caused either by attenuation of incoming signals, or by an increase in the level of "noise" against which the signal is received.

A68-81095
SIGNAL DETECTION ANALYSIS OF INSTRUMENTAL DISCRIMINATION CONDITIONING.

Milton D. Suboski and Abraham A. Spevack (Queen's U., Kingston, Ontario, Canada).
(Can. Psychol. Assn., Meeting, Ottawa, May 1967). Canadian Journal of Psychology, vol. 22, Feb. 1968, p. 26–34. 15 refs.
Soc. of Sigma Xi supported research.

Signal detection analysis was applied to data from rats bar pressing under different levels of food deprivation and during extinction, spontaneous recovery, and re-conditioning in discrimination conditioning. The results suggest that these variables affect primarily the criterion for a response rather than the extent to which the subject discriminates between stimuli. Signal detection methods appear not only to allow the evaluation of response bias, but also to provide an empirical descriptive framework capable of organizing and summarizing a diversity of experimental results and phenomena.

A68-81096
POSITIONAL ALCOHOL NYSTAGMUS IN THE CAT.
Yuichi Nito, Walter H. Johnson, and P. E. Ireland (Toronto, U., Dept. of Otolaryngol., Canada).
Annals of Otology Rhinology and Laryngology, vol. 77, Feb. 1968, p. 111–125. 7 refs.
Toronto, U. and Alcohol and Drug Addiction Res. Found., Ontario supported research.

Cats elicit Nylén's Type I positional nystagmus after alcohol ingestion. This nystagmus is abolished or modified by blocking the semicircular canals in various combinations. However, the characteristics of such nystagmus with regard to intoxication are quite different from post-rotary nystagmus. Some of the operated cats which exhibited no positional alcohol nystagmus, responded to rotations, or vice versa. Therefore, it seems possible, that Phase I of positional alcohol (PAN I) and post-rotary nystagmus are elicited by two different mechanisms: post-rotary nystagmus by the crista deflection mechanism primarily, while PAN I by some as yet unknown reaction between the semicircular canals and the central nervous system.

A68-81097
ALTITUDE ACCLIMATIZATION, A HISTORICAL INTRODUCTION EMPHASIZING THE REGULATION OF BREATHING.
Ralph H. Kellogg.
Physiologist, vol. 11, Feb. 1968, p. 37–57. 46 refs.
Grant NIH GM-09262.

A history of the study and investigation of altitude acclimatization was presented. Emphasis was placed on research of the regulation of breathing at high altitudes.

A68-81098
EFFECTS OF STRESS ON RISK TAKING.
Amia Lieblich (Jerusalem, Hebrew U., Israel).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 303–304.
Grant AF EOAR 65-32.

Rick-taking behavior was measured under three experimental conditions: (A) a neutral condition; (B) irrelevant stress condition; and (C) relevant stress condition. It was found that the amount of risk taking tended to increase under both stress conditions.

A68-81099
INTERITEM TIME DISTRIBUTION AND RESPONSE COMPATIBILITY IN THE SHORT-TERM SERIAL RETENTION OF DIGITS.
Gilbert J. Harris and Bradley Lown (N. Y., State U., Buffalo).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 295–296.
Grant PHS MH-11595.

Twenty digits were presented sequentially during a 40 sec. display period. Three conditions of inter-item time distribution and three conditions of compatibility of answer sheet forms were employed in a three by three factorial design. The 20 digits were either distributed evenly over time, in two groups of ten digits with a 20 sec. rest between groups, or in three groups of six, seven, and seven digits with ten sec. rests between groups. Three levels of compatibility consisted of answer sheets containing either 20 equally spaced answer blanks, two groups of ten blanks, or three groups of six, seven, and seven blanks. Results showed an interaction between the two variables. In addition, serial position curves showed multi-bowing effects which suggested both input and output anchoring.

A68-81100
VISUAL AND AUDITORY SIGNAL DETECTION.
Carl Cheney and Prescott Eaton.
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 301–302. 8 refs.
Eastern Wash. State Coll. supported research.

Humans participated in a signal detection experiment wherein nontransient signals were set up according to three different schedules. For two visual subjects observing responses illuminated a meter for 0.40 sec. two auditory subjects interrupted silence for 0.40 sec. by pressing the observing button. Cumulative observing response curves from these four subjects showed (1) a high degree of control by the schedule of signals and (2) no substantial differences between subjects. This finding is taken to indicate that observing response patterns are not subject to any scanning artifacts unique to visual signal detection experiments.

A68-81101
A STEEP BACKWARD MASKING CURVE.
F. J. Lillie and J. A. Gribben (Auckland, U., New Zealand).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 281–282. 6 refs.

Subjects identified briefly presented pairs of letters which were followed by a bright flash of light after a varying delay. Letter accuracy sharply increased as the flash delay exceeded 30-msec. and by 70-msec. delay had little further masking effect. Two stimulus durations showed different total accuracy scores, but the masking curves for the two durations were similar.

A68-81102
IMAGE FRAGMENTATIONS WITH AFTERIMAGES AND IN BINOCULAR RIVALRY.
Peter K. Smith (Cambridge, U., Great Britain).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 275–276. 5 refs.
Nuffield Found. supported research.

'Structured' and 'unstructured' fragmentations of a simple geometric figure were compared in conditions of binocular rivalry, and afterimage viewing, for ten subjects. For all subjects 'structured' fragmentations were found to be much less common and less stable in rivalry.

A68-81103
ADAPTATION TO PRISMATICALLY INDUCED CURVATURE WITH NONVISIBLE ARM MOVEMENTS.
Clarke A. Burnham (Tex., U., Austin).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 273–274.

Subjects, wearing prism spectacles to induce curvature, shot a pistol at a target moving in an apparently horizontal path. The subjects were able to hit the target without having to view their arms, hands, or the pistol. Adaptation occurred only in a condition requiring the learning of new afferent-efferent associations. The results are consistent with those of a prior shooting gallery study and were interpreted as supporting the efferent readiness theory of perception.

A68-81104
ACCURACY IN SIZE JUDGEMENTS AS A FUNCTION OF LOCATION IN THE VISUAL FIELD AND THE DURATION OF VIEWING.
Albert S. Rodwan (Emory U., Atlanta, Ga.).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 277–278. 8 refs.
Grant NIH MH 11210-02.

This study compared the effect of varying the duration of viewing and the location of the stimulus in the visual field. The duration of viewing varied from one msec. to one sec. in four equal log steps. The location parameter varied from having a fixation point and a reduction tube to presenting the stimulus randomly at five different locations on the screen. There was no effect due to duration of viewing, nor to location, but there was an effect due to the interaction between them. The interaction was due to a linear trend in the most extreme location condition.

A68-81105
FIGURAL AFTEREFFECTS, ILLUSIONS AND THE DIMENSION OF FIELD DEPENDENCE.
Alexander W. Pressey and Golda Koffman (Manitoba, U., Winnipeg, Canada).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 279–280. 9 refs.
Grant NRC, Canada APA-177.

Three groups of subjects consisting of low, intermediate, and high susceptibility to figural aftereffects were tested on the embedded-figures test, the rod-and-frame test, and the Poggendorff illusion. The results howed that, contrary to recent findings by Immergluck, there was no significant relationship between figural aftereffects and measures of field dependence. However, in men there was an inverse relationship between the magnitude of the Poggendorff illusion and figural aftereffects.

A68-81106
A SERIAL EFFECT IN TIME ESTIMATION.
Max Coltheart and Guy von Sturmer (Monash U., Clayton, Australia).
Psychonomic Science, vol. 10, Mar. 15, 1968, p. 283–284.

When a series of reproductions of an interval of time is made without interpolation of a standard between judgments, some studies suggest that the reproductions grow progressively longer; other work implies that the duration of reproductions is constant. In the present study, experiments using 10 sec. and 60 sec. intervals supported the former view. The increase in reproduction duration was a linear function of the trial number, n. The method for measuring subjective time proposed by others is criticized.

A68-81107
THE INFLUENCE OF AGING ON WOUND HEALING IN GERMFREE AND CONVENTIONAL MICE.
S. Rovin and H. A. Gordon (Ky., U., Coll. of Med., Dept. of Pharmacol. and Coll. of Dentistry, Dept. of Oral Pathol., Lexington).
Gerontologia, vol. 14, no. 2, 1968, p. 87–96. 22 refs.

Surgical excision of the tip of the tongue in young and old, germfree and conventional mice did not result in any chronologic or histologic differences in the rate and quality of healing among any of the animals. Thus, neither age nor the presence or absence of the usual oral flora altered the reaction to acute surgical trauma. Also, the age of the host did not contribute to the deleterious action of microorganisms. It is suggested that, following acute surgical trauma, when healing is delayed or altered either by infection or in the absence of infection, other factors than age alone are involved.

A68-81108
METHODS OF OBJECTIVE EXAMINATION OF THE VISUAL FIELD [O METODAKH OB"EKTIVNOGO ISSLEDOVANIIA POLIA ZRENIIA].
A. IA. Samoilov and A. R. Shakhnovich (USSR, Acad. of Med. Sci., N. N. Burdenko Inst. of Neurosurg., Moscow).
Oftal'mologicheskii Zhurnal, vol. 22, no. 7, 1967, p. 537–542. 5 refs. In Russian.

A method of local pupillography which was devised by the authors some years ago was used for objective examination of the visual field. With the help of the method used for determination of normal and hemianopic visual fields the pupillary reflex was shown to decrease from the center to the peripheral portions of the retina the pupillary reflex became so weak that it could not be seen with the naked eye and the objective examination on pupillogramms was helpful in this case. The method of objective perimetry, however, was considered to be advisable only in the case of mental or vocal disturbances, and in children.

A68-81109
AIR PORTABLE THOMAS SPLINT.
C. M. Samuel.
Journal of the Royal Army Medical Corps, vol. 114, no. 1, 1968, p. 43–45.

A variant of the Thomas Splint for ease of portability is described and illustrated.

A68-81110
DYNAMICS OF CARDIAC OUTPUT UNDER CONDITIONS OF INCREASING MUSCULAR WORK IN ATHLETES [DINAMIKA SERDECHNOGO VYBROSA V USLOVIIAKH VOZRASTAIUISHCHEI MYSHECHNOI RABOTY U SPORTSMENOV].
I. V. Aulik.
Latvijas Psr Zinatnu Akademijas Vestis, no. 10, 1967, p. 117–128. 53 refs. In Russian.

Basic patterns of heart adjustment to muscular work in highly trained athletes were as follows: (1) with the increase of work load, the pulse rate, respiratory volume per min., oxygen uptake, arterio-venous oxygen difference and cardiac output increased also. The increase in stroke volume and oxygen consumption coefficient occurred only during average work load; (2) relation between the amount of oxygen consumed per min. and the size of cardiac output, as well as the heart rate during muscular work, was almost rectilinear; (3) cardiac output in highly trained young athletes during work of growing intensity increased. In heart adaptation mechanism to muscular work, considerable variability was observed, conditioned in particular by the subject's degree of training; (4) highly qualified and trained athletes performed the same amount of work as untrained individuals with a lower heart rate, higher oxygen consumption coefficient and O_2 consumption per min. to heart rate per min. ratio. At peak work load the cardiac output in highly trained athletes proved to be higher.

A68-81111
SOME GENERAL ASPECTS OF OXYGEN DEPLETION.
Eugene D. Robin and H. Victor Murdaugh, Jr. (Pittsburgh, U., School of Med., Pa.).
International Anesthesiology Clinics, vol. 5, Spring 1967, p. 345–358. Tuberc. League, Pittsburgh supported research.

Clinical, biochemical and physiological aspects of oxygen depletion were outlined. Impairment of energy production and acidosis due oxygen depletion, both of which may result in death, were discussed. Oxygen balance and the hierarchy of organs in respect to the deleterious effects of oxygen depletion in the intact animals were also discussed. Adaptive changes given which permit

survival despite oxygen depletion included pulmonary adaptations, oxygen transport adaptations, circulatory adaptations and tissue adaptations.

A68-81112
MODE OF ACTION OF THYROCALCITONIN.
J. L. H. O'Riordan and G. D. Aurbach (NIH, Natl. Inst. of Arthritis and Metab. Diseases, Metab. Diseases Branch, Sect. on Mineral Metab., Bethesda, Md.).
(Am. Federation for Clin. Res., Meeting, Atlantic City, 1966).
Endocrinology, vol. 82, Feb. 1968, p. 377–383. 21 refs.

Thyrocalcitonin was given to rats 2.5 hr. after injecting ^{45}Ca intravenously. The normal continuous fall in specific activity of blood calcium was interrupted by the action of thyrocalcitonin but there was no effect on the disappearance of radiocalcium from the circulation even though serum Ca fell 30–50%. The data were analyzed with a computer program encompassing a model for calcium exchange with compartments arranged in series. The model adequately reproduced the experimental results which led to the conclusion that thyrocalcitonin acts by inhibiting resorption of calcium from bone.

A68-81113
ON THE INFLUENCE OF ATTITUDES TO THE SOURCE ON ANNOYANCE REACTIONS TO NOISE
Erland Jonsson and Stefan Sörensen (Stockholm, U., Dept. of Sociol.; Natl. Inst. of Public Health, Dept. of Environ. Hyg.; and Karolinska Inst., Dept. of Hyg., Stockholm, Sweden).
Nordisk Hygienisk Tidskrift, vol. 48, no. 2, 1967, p. 35–45. 15 refs.

The results of two studies concerning the connection between the attitude to a source of inconvenience and the inconvenience experienced were reported. The first study was a compilation of the data from previous investigations on inconvenience from external environmental factors, mainly noise and air pollution. The results indicated without exception a higher frequency of inconvenience for groups that had indirectly or directly shown a negative attitude to the source. In almost all cases this effect was significant. The expectation of a negative interdependence between the two variables was consequently verified. However, the results of this first study did not indicate directly whether differences in attitude had influenced the frequencies of inconvenience or whether the inconveniences suffered had in themselves caused a change of attitude. The second study was carried out in order to elucidate the causal relationship. A laboratory experiment was performed to determine whether or not it is possible to reduce or increase the frequency of inconvenience by changing the attitude to its source in a negative or positive direction. Three groups of test subjects were used. In one of the groups the attitude of the subjects to the source of inconvenience was influenced in a positive direction, in another group in a negative direction. The third group was used for control, and no attempt was made to influence attitude. In the first phase of the experiment the source of inconvenience was noise from an airfield, in the second noise from a motorway. The results of this experiment showed that a change of attitude in a negative direction caused an increased frequency of inconvenience, and a change in the positive direction a lower frequency. The frequency of inconvenience in the group influenced in a positive direction thus dropped from 75% to 40%. In the negatively influenced group the frequency of inconvenience increased to about 90% (in the case of air noise). The experiment reported showed that by changing the attitude it is possible to bring about a change in reactions to the source of inconvenience. However, the experiment does not make it possible to generalize regarding the size of this effect.

A68-81114
ULTRAVIOLET BACTERICIDAL IRRADIATION OF ICE.
P. A. Ladanyi and S. M. Morrison (Colo. State U., Dept. of Microbiol., Fort Collins).
Applied Microbiology, vol. 16 Mar. 1968, p. 463–467. 15 refs.
Grant PHS EF00507.

The germicidal activity of 2,537 A ultraviolet (UV) radiation on bacteria in ice cubes of varying thickness and in aqueous suspensions beneath an ice layer was investigated. The test bacteria used were *Escherichia coli, Serratia marcescens, Bacillus subtilis,* and *Sarcina lutea*; aqueous suspensions of the selected organisms were frozen into ice cubes, two mm. to 30 mm. thick, at −20°C. The cubes were irradiated for one min., whereas the suspensions of bacteria were placed beneath an ice block (19 cm. thick) and were irradiated for 0.5 to 15 min. In both groups of experiments, the standard plate count method was used to compare the number of bacteria surviving the UV treatment with the number of bacteria in the untreated controls. The results showed that one min. of UV treatment killed as many as 97% of the gram-negative and at least 60% of the gram-positive test bacteria (freezing survivors) frozen in ice cubes 30 mm. thick. Within 15 min., UV light transmitted through a 19-cm. thick ice block inactivated 98% of the bacteria suspended in the buffer solution. It was concluded that the UV rays were able to penetrate at least 19 cm. of ice and still retain enough energy to kill bacteria. However, the UV penetration depended greatly on the optical quality of the ice. Although it was not the purpose of these experiments to find a practical method for sanitizing ice, the results of this study and of our other unpublished experiments indicate that UV light has adequate penetrating power to be considered practical in certain selected applications.

A68-81115
REFLECTED LASER BEAM CAUSING ACCIDENTAL BURN OF RETINA.
Thomas L. Curtin and Douglas G. Boyden.
American Journal of Ophthalmology, vol. 65, Feb. 1968, p. 188–189.

A case is presented of a retinal burn caused by a reflected laser beam. The circumstances of the accident were reconstructed and the amount of energy contained in the reflected laser beam was determined to be 2.16 joules. Such reflected beams from pulsed ruby lasers are definite ocular hazards.

A68-81116
EFFECTS OF HYPEROXIA UPON MICROORGANISMS. I. MEMBRANE CULTURE TECHNIQUE FOR EXPOSING CELLS DIRECTLY TO TEST ATMOSPHERES.
Olen R. Brown and David O. Huggett (Mo., U., Space Sci. Res. Center and School of Med., Dept. of Microbiol., Columbia).
Applied Microbiology, vol. 16, Mar. 1968, p. 476–479. 12 refs.

A membrane culture technique was developed for directly exposing microorganisms to test atmospheres. Inhibition and killing were calculated from comparisons with air-grown cultures. Direct colony counts were used with low inocula. With mass inocula, plate colony counts and optical-density measurements were made on resuspended filter populations. Bacteria, including *Escherichia coli,* were more sensitive to oxygen than previously reported. With inocula of a few hundred cells per membrane, five of seven species failed to produce colonies while exposed to oxygen at one atmosphere. Upon reincubation in air, the survival of five species ranged from near 0 to 12% of the cells. *Aerobacter aeroqenes* was neither inhibited nor killed. With this technique, bacteria are in direct contact with the test atmosphere and cells which survive are detected but do not obscure the response of other cells in the population.

A68-81117
ON THE EARLY THYROID GLAND REACTION FOLLOWING TOTAL GAMMA-IRRADIATION [O RANNEI REAKTSII SHCHITOVIDNOI ZHELEZY POSLE OBSHCHEGO GAMMA-OBLUCHENIIA].
A. V. Tkachev (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Moscow).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 22, no. 12, 1967, p. 58–61. 5 refs. In Russian.

The paper reports experimental data on the thyroid reaction in rats three hr. after its irradiation with CO^{60} in doses of 300 r, 500 r, 700 r and 900 r. The results obtained show the sublethal doses of gamma-radiation capable of provoking a hyperthyroid reaction. Following irradiation of rats in doses of 900 r a decrease of the iodine-concentrating capacity of the thyroid is noted. It seems that stimulation of the thyroid by sublethal doses should be considered the result of the intensified thyreostimulating function of the hypophysis. Following irradiation with lethal doses, a local damaging effect of the iodine-concentrating function of the thyroid gland apparently prevails.

A68-81118
COMPARISON OF MICROBIAL CONTAMINATION LEVELS AMONG HOSPITAL OPERATING ROOMS AND INDUSTRIAL CLEAN ROOMS.
Martin S. Favero, John R. Puleo, James H. Marshall, and Gordon S. Oxborrow (Natl. Communicable Disease Center, Ecol. Invest. Program, Phoenix Field Sta. Sect., Planetary Quarantine Unit, Phoenix, Ariz.).
Applied Microbiology, vol. 16, Mar. 1968, p. 480–486. 14 refs.

Microbial contamination in industrial clean rooms was compared quantitatively and qualitatively with that of hospital operating rooms. The number of aerobic mesophilic microorganisms which accumulated on stainless-steel strips exposed for periods up to 21 wk. to the intramural air of four operating rooms was at least one log higher than the accumulation on strips exposed in four clean rooms, and was essentially the same as that found in two factory areas. Volumetric air samplings showed that there were significantly higher numbers of airborne viable particles per cubic foot of air in operating rooms than in industrial clean rooms. In contrast to clean rooms, where most of the airborne contaminants were those associated with human hair, skin, and respiratory tract, the hospital operating rooms showed a very high level of microorganisms associated with dust and soil.

A68-81119
CHANGES IN THE TESTES OF ALBINO RATS FOLLOWING SINGLE AND CHRONIC ACTION OF GAMMA-RAY IRRADIATION IN SMALL AND MEDIAN DOSES [IZMENENIE SEMENNIKOV U BELYKH KRYS PRI ODNOKRATNOM I KHRONICHESKOM VOZDEISTVII NA NIKH GAMMA-LUCHEI V MALYKH I SREDNIKH DOZAKH].
S. A. Keizer and G. A. Lemash (USSR, Min. of Health, Inst. of Biophys., Moscow).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 22, no. 12, 1967, p. 53–58. 16 refs In Russian.

Experiments on mongrel albino rats showed that single gamma-ray irradiation in doses of 0.1, 0.5, 2.5 and 5.0 r failed to produce any significant alteration in the spermatogenous epithelium. Chronic daily irradiation in doses indicated above resulted in distinct changes of spermatogenesis. These shifts became important only when the cumulative dose reached 25.0 r. Inhibition of spermatogenesis progressed proportionally to the summary irradiation dose. Results showed that in chronic irradiation with low doses (0.1 and 0.5 r/day) changes in the spermatogenous epithelium (as calculated per one r) were twice as high as in the irradiation with median doses (2.5 and 5.0 r/day).

A68-81120
CONTINUOUS-DILUTION METHOD FOR THE MASS CULTURE OF SYNCHRONIZED CELLS.
T. A. Hare and R. R. Schmidt (Va. Polytech. Inst., Dept. of Biochem. and Nutr., Blacksburg).
Applied Microbiology, vol. 16, Mar. 1968, p. 496–499. 14 refs.
Grants NSF GB-4682 and PHS GM 12042.

A new mass-culturing technique for synchronized cells is described. Continuous dilution with fresh culture medium provides the cells with nearly constant environmental conditions (continuous resupply of nutrients, constant adjustment of pH, maintenance of a nearly constant cell mass-to-culture volume ratio, etc.) at high cell densities, thereby resulting in the yield of ample cellular material for most biochemical studies during the cell cycle. The new mass-culturing system, when utilized to culture synchronous *Chlorella pyrenoidosa*, yielded approximately three times as much cellular material as previous nondilution method, in the same time period and in less than one-tenth the culture volume. Although the newly developed mass-culture method was tested with a unicellular green alga, the basic method should be readily adaptable to synchronous cultures of other microorganisms and to cells in tissue culture.

A68-81121
MYOCARDIAL AND ENDOCARDIAC ELECTRODES FOR CHRONIC IMPLANTATION.
Wilson Greatbatch and William M. Chardack (N. Y., State U., Buffalo).
Annals of the New York Academy of Sciences, vol. 148, Feb. 1, 1968, p. 234–251. 20 refs.

The installation and operation of myocardial and endocardiac electrodes were discussed. The following conclusions were made. Physiological cardiac electrodes, when operated in saline, exhibit nonlinear behavior at normal pacemaking levels of voltage and current. Electrochemical polarization either contributes to, or controls: (a) the gross capacitive nature of pacemaker loads; (b) the differences in waveforms between electrodes of different materials; (c) electrolytic destruction of electrode materials; and (d) the effects of pulse length and current as well as voltage on electrolytic destruction of physiological electrodes. Of all the electrode materials tested, 90% platinum-10% iridium showed the best combination of inertness, low overvoltage and stability vs. time. This alloy also showed the highest electrode capacity of the alloys. Until nonnoble electrode metals have been proven to be innocuous in the body, while under stimulation, for long periods, platinum and its alloys appear to be the metals of choice for chronically implanted cardiac electrodes.

A68-81122
RELATIONS OF THE HUMAN VERTEX POTENTIAL TO ACOUSTIC INPUT: LOUDNESS AND MASKING.
Hallowell Davis, Clyde Bowers, and Shirley K. Hirsh (Central Inst. for the Deaf, St. Louis, Mo.).
Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 431–438. 7 refs.
PHS supported research.

The rate of increase of amplitude of V (vertex) potentials with the SPL of tone bursts is very slow. In one experiment, the exponent of the power law was 0.15 at 250 Hz., 0.11 at 1,000 Hz. and only 0.08 at 4,000 Hz. Individual differences across subjects seemed more important than the interval between stimuli (one sec. vs. 3.2 sec.), and variability across trials often obscured the relation to intensity. In the presence of appropriate bands of masking noise, the input-output curves rise abruptly from the masked threshold to approach the unmasked amplitude at a level about 30 dB above the corresponding masked threshold. The effect resembles recruitment of loudness. Tone pips and tone bursts of different frequency that were judged equally loud evoked slow V

potentials of approximately equal amplitude. In some subjects, however, bursts of white noise evoked significantly larger responses than equally loud tone bursts or pips. In spite of the partial similarities between them, the amplitude of the V potential and the sensation of loudness are related differently to the parameters of the acoustic stimulus.

A68-81123
SIMPLE VISUAL AND SIMPLE AUDITORY REACTION TIME: A COMPARISON.
Rogers Elliott (Dartmouth Coll., Hanover, N. H.).
Psychonomic Science, vol. 10, Apr. 5, 1968, p. 335–336.
Grant PHS HD 01571.

In two experiments the classically reported difference of about 40 msec. between simple reaction time (RT) to high intensity tone and light was reproduced using 1° and 3° targets, but was reduced to 24 msec. by illuminating virtually the whole retinal surface. In a third experiment, the indicated relations between target size and RT were repeated.

A68-81124
REFLEX CHEMOCEPTIVE REGULATION OF ARTERIAL PRESSURE DURING NATURAL SLEEP IN THE CAT.
Maurizio Guazzi, Giorgio Baccelli, and Alberto Zanchetti (Milan, U., Ist. di Patol. Med. and Consiglio Nazl. delle Ric., Gruppo Nazl. di Med. Sper., Sez. di Fisiopatol. Cardiovascolare, Milan, Italy).
American Journal of Physiology, vol. 214, May 1968, p. 969–978. 33 refs.
Grants AF EOAR 65-6 and AF EOAR 66-47; Consiglio Nazl. delle Ric. supported research.

Experiments have been carried out in chronic cats subjected to selective interruption of either the chemoceptive or the baroceptive afferents from the carotid bifurcation region. The results have shown that the remarkable exaggeration of the blood pressure fall, observed during deep desynchronized sleep in cats subjected to complete sinoaortic deafferentation, is reproduced by selective chemoceptive denervation, although selective baroceptive deafferentation is ineffective in this respect. These observations clearly point out that the neural depressor influences active during sleep are effectively buffered in the intact animal by reflex chemoceptive discharges arising in the carotid bodies and, presumably, in the aortic body as well. Our data also suggest that the chemoceptors play a role in circulatory homeostasis in physiological conditions.

A68-81125
TRAUMATIC PATHOLOGY OF THE VERTEBRAL COLUMN AMONG FLYING PERSONNEL. SYNTHETIC STUDY [LA PATHOLOGIE TRAUMATIQUE DU RACHIS DU PERSONNEL NAVIGANT ETUDE SYNTHETIQUE].
Roland-Paul Delahaye, Roger Pannier, and Henri Seris.
(Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Médecine Aéronautique et Spatiale, vol. 6, no. 24, 1967, p. 33–35. 7 refs. In French.

After studying in detail the different aspects of traumatic lesions resulting from parachute jumps, it seemed interesting to compare them with the injuries encountered among flying personnel. They were numerous and could be divided into two categories: (1) lesions due to vibrations and prolonged accelerations; (2) lesions occurring during ejections or plane crashes. The flying personnel were subjected to injury risks, but their occurrence were infrequent. The use of radiographies after every accident and regular medical surveillance easily detected cases of post-traumatic arthrosis or residual lumbar pains and to treat them efficaciously.

A68-81126
AN EXPERIMENTAL SPACE COMBINING INDIVIDUAL AND SOCIAL PERFORMANCES.
C. B. Ferster, C. Hammer, and J. Randolph (Georgetown U., Eye Res. Inst., Washington, D. C. and Abbott Labs., North Chicago, Ill.).
Journal of the Experimental Analysis of Behavior, vol. 11, Mar. 1968, p. 209–220. 20 refs.
NAS Grant NsG-450, Grants DA 49 146 XZ464, NSF-G25122, and NIH 5 K03MH05744-05.

This report describes several primate environments in which two or more animals shared a common social area. Automatic programming was used to permit concurrent individual sessions. Some of the behavioral phenomena observed in these environments, including reinforcing properties of social interactions, are discussed.

A68-81127
REVERSAL OF PREFERENCE UNDER PROGRESSIVE-RATIO SCHEDULES BY PUNISHMENT.
J. F. Dardano (Md., U., College Park).
Journal of the Experimental Analysis of Behavior, vol. 11, Mar. 1968, p. 133–146. 14 refs.
NASA supported research.

Pigeons were used in this study in which they were punished for producing the occasion for a shorter work requirement to obtain food. A progressive-ratio reinforcement schedule, in which successive reinforcements required an additional 50 responses, was programmed on one key. A response on a second key reset the progressive-ratio schedule to the first step. Before punishment, all pigeons consistently reset the schedule after reinforcement on the first step, thereby minimizing the number of responses required for reinforcement. Punishment was a brief electric shock contingent upon each response on the reset key. The first effect of punishment was to change the frequency of extra responses on the reset key. Under higher intensities of punishment, the pigeons completed the advanced steps of the progressive-ratio schedule before resetting to the first step. Completions of advanced steps was accompanied by decreases in the overall rate of responding and the rate of reinforcement. When the punishment contingency was removed, the major features of pre-punishment performance were recovered.

A68-81128
LOCUS OF FACILITATION FOR PAIRED-ASSOCIATE LEARNING UNDER FIXED-ORDER PRESENTATION.
S. Jay Samuels (Minn., U., Minneapolis) and Wendell E. Jeffrey (Calif., U., Los Angeles).
Psychonomic Science, vol. 10, Apr. 5, 1968, p. 355–356. 8 refs.
Grants NSF GS 1761 and NICHHD PO 1-HD-01136; Minn., U. supported research.

Experiments comparing the effects of fixed- and random-order serial presentation on paired-associate learning have not produced consistent results. On the assumption that differences may appear at only a certain point in the learning process, an experiment was devised to determine the form of the learning curves under the two conditions. A test trial on which the order of the pairs were randomized from test to test followed each of 20 study trials with pairs in either random or fixed order. Facilitation by fixed order presentation appeared toward the end of learning and although both groups reached asymptote, the fixed-order group reached it considerably ahead of the random-order group. Analysis of the data suggests a possible reason for the superiority of fixed-order presentation.

A68-81129
NEUROENDOCRINE DISINTEGRATION IN RADIATION SICKNESS SYNDROME. [NEIRO-ENDIKRINNAIA DEZINTEGRATSIIA PRI LUCHEVOM SINDROME].

A. A. Voitkevich (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 22, no. 12, 1967, p. 5–14. 11 refs. In Russian.

Generalization was made from results subsequent to an experimental research of endocrine disturbances of radiation sickness in rats, dogs, frogs and hamsters, evoked by an external or internal gamma-, beta- and alpha-irradiation. The conclusions were based on the results of histochemical, electron-microscopic and historadiographic study of neurosecretory cells in the supraoptic nucleus of the hypothalamus and endocrine glands. A gradation of the degree of radiation damage of different organoids in neurosecretory and glandular cells was established. The local manifestation of the radiation effect for the neurosecretory region was determined by the condition of the triad: neuron, glial satellite and capillary endothelium; for the endocrine organs by the state of the connective tissue, glandular cells and vascular reaction. A centrifugally oriented gradient indicative of the degree of the radiation damage inflicted upon the system was ascertained, starting with the hypothalamus and ending with the hypophysis and peripheral glands. At the root of the culminating phase in radiation sickness were morphological and functional disintegration of the neuroendocrine complex, with predominance of functional overstress, dystrophy, as well as partial destruction of neurosecretory elements and glandular cells. Under consideration was the role played by hormones in the realization of onto- and phylogenetic gradations in the extent of radiation damage. An oriented change of the hormonal background appeared as a major condition for the regulation of reparative and formative processes in the irradiated tissues. The phasic nature marking the development of the neuroendocrine disintegration must remain a focal point in the causal analysis of pathological processes in radiation sickness syndrome.

A68-81130
SPINAL FRACTURES AMONG PARACHUTISTS (BASED ON 219 CASES) [LES FRACTURES DU RACHIS CHEZ LE PARACHUTISTE (A PROPOS DE 219 CAS)].
M. J. Teyssandier and R. P. Delahaye.
(Soc. Franc. de Physiol. et de Médecine Aéronautique et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Medecine Aeronautique et Spatiale, vol. 6, no. 24, 1967, p. 19–23. In French.

Two-hundred and nineteen spinal column fractures were noted during 1,468,399 jumps, they represented one percent of the total number of accidents. Their percentage in relation to the number of jumps decreased every year. Rigid control was maintained over the physical fitness of airborne troops with their equipment weight limited to 80 kg. and by elimination of all subjects presenting some congenital vertebral defect, even minor. In one-fifth of the spinal fracture cases more than one vertebra was injured, fractures of the cervical column were very rare. An analytical study of the vertebrae injured confirmed that the highest incidence of lesions occurred between T12 and L3. Clinically and radiographically fractures of the vertebral column due to parachuting presented no peculiarity. Fractures with impairment of the posterior wall of Rieunau were rare, occurring once every 100,000 jumps.

A68-81131
THE SPINAL SYNDROME AMONG PARACHUTISTS (BASED ON 1,033,525 JUMPS) [LE SYNDROME VERTEBRAL DU PARACHUTISTE (A PROPOS DE 1.033.525 SAUTS)].
M. J. Teyssandier.
(Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Médecine Aéronautique et Spatiale, vol. 6, no. 24, 1967, p. 25–31. 66 refs. In French.

This study described the spinal syndrome of the parachutist as to its uniqueness, frequency (six times more frequent than spinal fractures), and the rapidity of appearance of the first symptoms among those who jumped often. Clinically the main sign was pain appearing in two forms one chronic and the other acute. In more than 50% of the cases X-rays showed lesions of the vertebral column either congenital or acquired. In the other cases the radiographies were normal. From the psycho-somatic point of view, pain subsequent to spinal lesions had medico-legal consequences and showed a functional disturbance of the vertebral column lateral muscles. From the etiopathogenic point of view, cumulation of micro-traumatisms, and bio-hormonal reactions due to stress and fatigue seemed to be causes of the spinal syndrome. To eliminate the main or contributory causes of accidents a rigid control should be exercised over parachutist selection, and should include a systematic radiography of the vertebral column, supported by regular surveillance of parachutists' fitness. Certain sports and physical conditioning exercises are recommended in order to acquire and maintain the fitness; and the pain and functional disability subsequent to the spinal syndrome should be considered an occupational disease.

A68-81132
CORRELATION OF REACTIONS COMING FROM THE CORTICAL AND MEDULLARY SUBSTANCES OF THE SUPRARENALS IN RESPONSE TO IRRADIATION INJURY [KORRELIATSIIA V REAKTSIIAKH KORKOVOGO I MOZGOVOGO VESHCHESTVA NADPOCHECHNIKA NA OBLUCHENIE].
G. A. Tkacheva (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 22, no. 12, 1967, p. 33–38. 8 refs. In Russian.

The purpose of this work was to determine the nature of the suprarenals medullary and cortical substances interactions in different phases of acute and subacute radiation sickness, provoked by a single total gamma-irradiation of Vistar rats with doses of 900 to 600 r. The distribution of total catecholamines, norepinephrine, ketosteroids, cholesterol, steroid-3β-dehydrogenase enzymes activity, succinate-dehydrogenase and alkaline phosphatase was studied; karyometry of chromaffin and fascicular cells was also carried out. An early reaction to irradiation characterized by the mobilization of hormonally active principles of the cortical and medullary substances, proceeded in the same fashion under the effect of both doses. A week after irradiation of 900 r the cortical substance developed typical processes of compensation, superceded by a secondary reduction of hormones. The latter was associated with a maximal hypertrophy of cortical cells and high activity of enzymes and, for this reason, might be considered as a result of adrenocortical insufficiency in the organism of irradiated animals. In conditions of acute radiation sickness the medullary substance underwent profound destructive alterations. In a subacute form of radiation sickness (600 r) the compensation reaction in the suprarenals developed at an earlier data than in the case of an irradiation of 900 r. This was followed by a reduction of hormonopoietic function in both layers, giving way to the active proliferation processes. Irradiation of 600 r was not accompanied by disturbed functional integrity of the adrenal gland, inherent in intact animals. On the other hand, an increase of the dose up to 900 r entailed a rapid depression and destruction of the medullary substance, which came in conjunction with hyperfunction of cortical cells.

A68-81133
ULTRASTRUCTURE OF NEUROSECRETORY CELLS IN THE SUPRAOPTIC NUCLEUS OF RATS FOLLOWING A RADIATION INJURY [UL'TRASTRUKTURA NEIROSEKRETORNYKH KLETOK SUPRAOPTICHESKOGO IADRA KRYS PRI RADIATSIONNOM PORAZHENII].

I. I. Dedov (USSR, Acad. of Med. Sci., Inst. of Med. Radiol., Obninsk).
Vestnik Akademii Meditsinskikh Nauk SSSR, vol. 22, no. 12, 1967, p. 38-45. 47 refs. In Russian.

The paper presents results of an electron-microscopic and histochemical study of neurosecretory cells in the supraoptic nucleus of rats, irradiated with a minimal lethal dose of 900 r, at a dose rate of 77 r/sec. In the latent period a short-lived activation of the neurosecretion is noted. The first destructive changes occur in the mitochondria. The swelling of the mitochondria (79 hr. following irradiation) is superseded by the cristae fragmentation. At the height of radiation sickness an increase in lysosome formation is observed in the Golgi apparatus. The sites which mark the localization of the latter organoids are subject to destruction. Karyopyknosis, karyolysis and ribosomes reduction induce the blocking of the neurosecretion synthesis. The specificity of the irradiation effect on the neurons, the part played by lysosomes in the realization of the radiation effect, along with some other issues are discussed.

A68-81134
ELECTRODE PROBLEMS IN CENTRAL NERVOUS MONITORING IN PERFORMING SUBJECTS.
R. T. Kado and W. R. Adey (Calif., U., Brain Res. Inst., Space Biol. Lab., Los Angeles).
Annals of the New York Academy of Sciences, vol. 148, Feb. 1, 1968, p. 263-278. 9 refs.
NASA Contracts NsG-2503, NASA NsG-505, NASA NAS-NAS-O-1970, and AF-AFOSR 246-63 and 61-81.

The problems of surface and deep electroencephalograph (EEG) recording electrodes for use in performing man and animals are reviewed. An EEG scalp electrode is described, which overcomes problems of contact potentials at a metal-liquid interface, and minimizes artifacts when used in a nonadhesive scalp contact. Requirements for electrode-amplifiers and associated multichannel telemetry systems are reviewed. Preparations for comprehensive electrophysiological recording of data from central nervous and peripheral neuromuscular systems in a primate 30-day biosatellite flight are discussed. Examples are privided of analysis of EEG data in a performing astronaut, and requirements reviewed for EEG monitoring in prolonged space flight.

A68-81135
TRAUMAS OF THE VERTEBRAL COLUMN AMONG PARACHUTISTS. STATISTICAL AND ETIOLOGICAL-PATHOGENIC STUDY BASED ON 1,033,525 JUMPS [LES ATTEINTES TRAUMATIQUES DU RACHIS CHEZ LE PARACHUTISTE (ETUDE STATISTIQUE ET ETIO-PATHOGENIQUE A PROPOS DE 1.033.525 SAUTS)].
M. J. Teyssandier.
(Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Medecine Aeronautique et Spatiale, vol. 6, no. 24, 1967, p. 15-18. In French.

The frequency of the vertebral column injuries among parachutists was stressed in this statistic and etio-pathogenic study. They occurred about once every 1,000 jumps, representing one-tenth of the total of accident incidences, and one-half of the total number of fractures noted during 1,033,525 jumps. The level of spinal fractures determined by X-rays showed a preponderance of lesions in the region T12-L3, and the dorso-lumbar and cervico-dorsal articulations. In 90% of cases the accidents occurred during the landing and were due to bad posture. They were of three kinds: bony, muscular and disco-ligamentous. From the evidence outlined above certain fitness criteria for parachute jumping were inferred.

A68-81136
INFORMATION PROCESSING, PRACTICE AND SPARE CAPACITY.
E. Linden Hilgendorf (Aeron. Res. Labs., Human Eng. Group., Melbourne, Australia).
Australian Journal of Psychology, vol. 19, Dec. 1967, p. 241-251. 26 refs.

The relationship between information input and response time was studied during extended practice, using visual stimuli of up to ten bits of information per stimulus. Response time was found to be directly related to information input and the relationship was found to persist after practice, contrary to findings reported in several recent studies. On the final trial a secondary auditory task was introduced. Performance on this task was inversely related to the information content of the primary task, which showed a significant decrement when both tasks were performed concurrently. Five hypotheses derived from earlier work are examined in the light of the results obtained.

A68-81137
ELECTROCARDIOGRAPHIC STUDY OF FREE FALL [ASPECTS ELECTROCARDIOGRAPHIQUES DE LA CHUTE LIBRE].
L. C. Jouffray, C. Renner, J. C. Camus, C. Robert, and C. Pedoya.
(Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Medecine Aeronautique et Spatiale, vol. 6, no. 24, 1967, p. 37-44. In French.

A miniaturized and transistorized portable electrocardiograph of the "Cardette" type placed under the chest-pack parachute was used for the experiments. The parachute jumps were made from helicopters and airplanes for recording high altitude electrocardiograms (ECG). The recordings were made before the jumps without the parachute pack, during the free fall, and immediately after the landing. The results obtained showed an increase in the heart rate during the free fall and a decrease rapidly after landing. No arrythmias or conduction disturbances were noted: the S-T segment presented no marked changes, and the T-wave amplitude increased or decreased but inversion was never observed. It was concluded that parachute jumps did not present a danger for normal hearts, but nonetheless the heart being subjected to severe stress, rigid control and surveillance over the selection of personnel, as far as the cardiovascular system is concerned, were considered necessary. Further work on the subject is recommended.

A68-81138
INJURIES AND FRACTURES RESULTING FROM PARACHUTE JUMPS. STATISTICAL STUDY BASED ON 2,469,163 JUMPS [LES ACCIDENTS ET LES FRACTURES DUS AU PARACHUTISME (ETUDE STATISTIQUE A PROPOS DE 2.469.163 SAUTS)].
Richaud, Baudrit, and Teyssandier.
(Soc. Franc. de Physiol. et de Med. Aeron. et Cosmonautiques, Meeting, Jun. 16, 1967).
Revue de Medecine Aeronautique et Spatiale, vol. 6, no. 24, 1967, p. 11-13. In French.

Results of statistical studies of accidents occurring during parachute jumps showed that the total number of accidents was about one per 100 jumps, increasing to 1.48 per 100 for qualifying jumps and 1.80 per 100 for night jumps. Fractures occurred nearly once every 10,000 parachute jumps for the whole of the French Airborne Troops. Averages calculated for five yr. indicated the occurrence of one fracture for every 90 paratroopers with an average of 11 parachute jumps per yr. Student parachutists had about two fractures for 10,000 jumps. A comparative statistical study of French and foreign data on accidents, showed that the French training and parachute jumping methods were up-to-date.

A68-81139
THE EFFECTS OF HYDRAZINE UPON THE CONCENTRATIONS OF FREE AMINO ACIDS OF PLASMA AND URINE.
Patricia Korty and Fredric L. Coe (USAF School of Aerospace Med., Biosci. Branch, Physiol. Chem. Sect., Brooks AFB, Tex.).
Journal of Pharmacology and Experimental Therapeutics, vol. 160, Mar. 1968, p. 212–216. 11 refs.

The effects of hydrazine on free amino acids of plasma and urine were studied in dogs. Administration of hydrazine in doses of 25 mg./kg. produces large increases in the plasma concentration of all amino acids, with a concomitant rise in urinary excretion. Tyrosine and alanine are particularly responsive to hydrazine, manifesting 22- and 4-fold increases, respectively. The mechanisms responsible for these effects of hydrazine are unknown; however, some data implicate impairment of gluconeogenesis.

A68-81140
ELECTRODE EXPERIENCE IN CLINICAL BIOMEDICAL MONITORING.
David G. Simons and Carlos Vallbona (Baylor U., Coll. of Med., Houston, Tex.).
Annals of the New York Academy of Sciences, vol. 148, Feb. 1, 1968, p. 279–284. 15 refs.
Grants PHS FR-129, PHS HM-00365, and PHS RT-4.

Electrode techniques used for two types of monitoring situations were presented, and factors which influence the monitored data were discussed. Stress situations ranged from sleep through clinical stress testing, simulated and in-flight monitoring. Stress responses which were monitored included electroencephalographic, electrocardiographic, respiratory and skin resistance responses. It was concluded that a sufficient variety of electrodes and electrode techniques are available to provide satisfactory trade-off for particular application requirements. Only extreme requirements for reliability, duration beyond weeks or absolute comfort remain unsolved.

A68-81141
VACUUM ULTRAVIOLET STUDIES ON THE NATURE OF THE RADIATION INACTIVATION OF TRYPSIN.
Edward Yeargers and Leroy Augenstein (Mich. State U., Biophys. Dept. East Lansing).
Biophysical Journal, vol. 8, Apr. 1968, p. 500–509. 24 refs.
Contract AEC AT(11-1)-1155.

Trypsin, in powder form and in frozen D_2O-glucose solutions, at temperatures from 100° to 300°K., was excited with vacuum ultraviolet and near ultraviolet radiation to determine how absorbed photon energy is partitioned into radiative, noradiative and/or inactivating processes; at 300°K. most of the absorbed energy is not reemitted, so that it (0.98–0.99 for excitation at 120 nm. and 0.75–0.90 at 280 nm.) is potentially available for inactivation. Since the effects of excitation wavelength and temperature on the emission quenching yields are generally different from those on the inactivation yields of dry trypsin, the mere retention of quenched energy by an enzyme does not necessarily lead to its inactivation. Thus, as predicted previously, the radiation inactivation of trypsin must proceed by rather specific mechanisms which undoubtedly depend upon environment-sensitive processes, since the nature of the molecular environment can modify the partitioning of energy so significantly; for example, there are differences in the phosphorescence-to-fluorescence ratio, in the activation energy for quenching, and in the lifetimes and kinetics of the decay of phosphorescence when trypsin in frozen glasses and dry trypsin are excited by various wavelengths of ultraviolet radiation.

A68-81142
VISUAL AND AUDITORY PERFORMANCE VARIATIONS WITH AGE: SOME IMPLICATIONS.
Thomas Farrimond (Waikato, U., New Zealand).
Australian Journal of Psychology, vol. 19, Dec. 1967, p. 193–201. 17 refs.

Dynamic visual acuity declined with age, and was generally poorer in females than in males. Sex differences in visual and auditory acuity are ascribed to influences of training and experience. Some implications are made concerning the effects of peripheral variables upon performance in psychological tests. Groups differing in dynamic visual acuity obtain different scores in tests such as Raven's Matrices but show little difference in verbal tests. It is suggested that some of the decline in ability which occurs with age in certain tests may be due to changes in efficiency of the visual processes.

A68-81143
CONSIDERATIONS ON PHOTOFLUOROGRAPHY ADVANTAGES IN CARDIOMETRIC EVALUATION OF FLYING PERSONNEL [CONSIDERAZIONI SUI VANTAGGI DELLA SCHERMOGRAFIA PER LA VALUTAZIONE DEI DATI CARDIOMETRICI NEL PERSONALE AERONAVIGANTE].
P. Italiano (Ist. Med.-Legale Per l'A.M. "A. Mosso", Milan, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 320–332. 23 refs. In Italian.

On the basis of his experience on X-ray thorax examination now carried out on flying personnel comprehensive of telecardiography, the writer suggests that this last method be replaced with photofluorography. Also pilot candidates could be submitted to this examination. This method is to be considered as a screening photofluorography, i.e., a method supported with other collateral examinations as heart physical and laboratory examinations, electrocardiography and phonocardiography records. Advantages of this method are summarized shortly as follows: a more practical and simple technique, a remarkable time saving (since a large number of subjects can be examined), and a smaller staff. Particularly dealing with cardiometry, the writer considers the different criteria used by other authors difficult and unpractical. Because of this he suggests that orientative criteria of heart size, the heart/chest ratio, according to Dietlen, would be particularly useful for evaluation relating to body size. This method meets more than others the above mentioned criteria of a simple, rapid and practical study. This suggestion implied, of course, good clinico-radiological training and experience of the examiner, that has to relate the cardiomediastinal shadow with other chest part. Finally, at the first suspicion of heart disease this examination will have to be completed with standard methods. In conclusion the writer suggests radiology sections Air Force Medico-legal Institutes should be standardized, in order to have permanently available, also after 20 yr., the records of the examinations carried out at each control, to evaluate heart size changes related to aging and diseases.

A68-81144
STUDY OF SECONDARY EFFECTS OF PRENYLAMINE WITH SIMULATORS [RECHERCHE D'EFFETS SECONDAIRES DE LA PRENYLAMINE A L'AIDE D'UNE METHODE DE PILOTAGE SIMULE].
Auffret and Seris.
Revue de Médecine Aéronautique et Spatiale, vol. 6, no. 24, 1967, p. 45–49. 8 refs. In French.

Segontin (Prenylamine lactate) is a drug usually used in cardiac therapy; it reduces the noradrenaline levels in the myocardium, dilates the coronary arteries and provides a mild sedative action on the central nervous system. The effect of this drug on the

reaction time in visual display tests was studied in nine subjects, divided into three groups of three subjects each. The first was used as control, the second received placebos and the third the drug. The study showed no marked differences in the performance of the three groups; no drowsiness or change in psychomotor behavior was noted. The experiments showed that the administration of Segontin caused no secondary effects.

A68-81145
VESTIBULAR ADAPTION OF JET PILOTS [SULL'ADATTAMENTO VESTIBOLARE NEI PILOTI DI AVIOGETTO].

E. De Francesco (Ist. Med.-Legale dell'A.M. "Aldo di Loreto", Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 333–360. 34 refs. In Italian.

Two groups of individuals (ten inexpert subjects and ten F 104 pilots) were subjected to repeated and periodic rotary stimuli with the same technique, and gave different vestibular responses. It was suggested that a possible physiological adaptation of the vestibular apparatus in pilots would be a conditioning of their nystagmic and perceptive responses because of their large flight activity. This hypothesis was supported by the following findings: the average values of nystagmus duration, oscillation number and amplitude and slow oscillation mean angular velocity were always smaller after the first stimulus than the ones recorded in inexpert individuals. This conditioning could perhaps explain the attenuation of nystagmic response (decrease of oscillations duration and total number, disrhythmia) that occurs through successive rotary stimuli, with a less evident effect in adapted subjects. These characteristics are: a small but constantly longer mean frequency of oscillations, amplitude decrease, typical behavior of slow oscillation angular velocity and more rapid regular and constant perception of rotation.

A68-81146
PERCEPTIVE BRADYACUSIA IN AIR FORCE TECHNICIANS DUE TO F 104 G JET NOISE [IPOACUSIE PERCETTIVE DEL PERSONALE SPECIALISTA DELL'AERONAUTICA MILITARE PROVOCATE DA RUMORI DI AVIOGETTI F.104 G].

P. P. Castagliuolo (Ist. Med.-Legale per l'A.M. "G. Gradenico", Naples, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicine Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 361–373. 32 refs. In Italian.

Sound pressure levels were determined, both in a F 104 G jet plane and in a Grumman propeller plane, by phonometry, in two air bases. A clinical examination of acoustic and vestibular apparatuses was carried out in technicians of these two bases and the results were compared. The study dealt particularly with young people selected through audiometric examination. Early cochlear damage and hearing loss were noted by comparing the results in the technicians, depending on the extreme sound pressure produced by the supersonic airplane. In a few cases damage was reported of the posterior labyrinth, as well as remarkable acoustic effects of noise on the body. The treatment given and its results are reported. Prevention of acoustic and general damages is discussed based on three main points: (1) careful selection of technicians of jet bases; (2) periodic severe control, treatment and rest periods; and (3) protection by means of anti-noise helmets of suitable efficiency.

A68-81147
PREDICTION OF MONAURAL DETECTION.

B. E. Mulligan, J. C. Adams, M. J. Mulligan, and R. E. Burwinkle (Ga., U., Dept. of Psychol., Athens).

Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 481–486. 18 refs. PHS and Ga., U. supported research.

The optimum receiver for the case where signal is known except for phase has been suggested as a model for auditory detection of sinusoidal signals in noise. We have furthered application of this model in an effort to evaluate some of the parameters of monaural detection that are important for prediction. Of particular interest is bandwidth, or "critical band," which was found to decrease as signal-to-noise ratio increases, the rate of decrease being a function of frequency. Bandwidths were derived from the parametric values of the receiver-operating characteristics (ROC) that describe the detection performance of our observers. It was found that human ROC's are closely matched by ideal ROC's. The ROC's of the observers were obtained with a six-category rating scale and the measure of detection was d_s. Values of d_s were obtained at 500, 800, 1300, 2500 and 4000 Hz, over a range of signal-to-noise (S/N) ratios. It was found that the relationship of d_s to S/N ratio at all signal frequencies could be summarized by a single equation, the psychometric function. Other equations are also given so that the psychometric function for any signal frequency may be determined simply from a knowledge of the power per unit bandwidth of the masking noise.

A68-81148
CONSIDERATIONS ON ACOUSTIC AND VESTIBULAR THRESHOLDS IN MODERN SELECTION OF PILOTS [CONSIDERAZIONI SUI VALORI LIMITE AUDIO-VESTIBOLARI NELLA SELEZIONE DEL PILOTA NELL'ERA MODERNA].

C. Koch (Ist. Med.-Legale per l'A.M. "Angelo Mosso", Milan, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 95–101. 11 refs. In Italian.

After a short historical survey of the technical development of human flight in air and space, the importance of auditory thresholds and vestibular functions was stressed. Auditory requirements, especially discrimination capabilities, for space flight are high because of voice and auditory signals during complex operations. The importance of vestibular function at decreased gravity was indicated. Recent electrophysiological, histochemical and physiological studies and observations of astronauts added to the knowledge of vestibular functions. It was concluded that vestibular function undergoes adaptation to stimuli of abnormal and supraliminal duration and intensity. This adaptation is characterized by a decrease in the subjective sensation of the stimulus intensity. This adaptation was documented by extensive research on pychosensory subjectivity and electrophysiological observations.

A68-81149
DETECTION OF AUDITORY SIGNAL IN RESTRICTED SETS OF REPRODUCIBLE NOISE.

Sheila M. Pfafflin (Bell Telephone Labs., Murray Hill, N. J.).

Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 487–490.

The detectability of auditory signals in reproducible random noise was studied under two conditions; a single noise used throughout a block of 288 trials, and 12 noises occurring at random, but with equal frequency, throughout a block of trials. Both two-interval forced-choice judgments and judgments of the presence or absence of the signal in single-noise samples were obtained in separate blocks of trials. On individual trials of the forced-choice judgments, the same noise appeared in both intervals. Signal detectability was found to be significantly better when a single noise was present in a block of trials. Introducing variability in the stimulus by altering the number of different signal levels presented

during a block of trials did not affect detection. The results support the importance of memory for the noise from trial to trial in the detection process.

A68-81150
IMPEDANCE AT THE EARDRUM, MIDDLE-EAR TRANSMISSION, AND EQUAL LOUDNESS.
Strange Ross (Mich., U., Center for Res. on Language and Language Behavior, Ann Arbor).
Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 491–515. 19 refs. HEW. Dept. supported research.

Acoustic impedance at the eardrum was measured on three subjects as a function of frequency (20 c.p.s. to about 1,000 c.p.s.) and intensity (minimum 65 db. SPL; maximum 150 db. SPL, at eardrum) of a sustained ipsilateral sinusoidal stimulation by means of an inversely driven Zwislocki acoustic bridge. At lower intensity levels, acoustic impedance was independent of level, resistance and reactance varying with frequency according to $R = af^{-1/2}$ and $X = bf^{-3/4}$, respectively, from 20 c.p.s. to about 300 c.p.s.; above 300 c.p.s., resistance remained essentially constant, and negative reactance decreased rapidly. At higher levels, one subject showed variations in impedance attributable to the acoustic reflex. At levels above 120 db. SPL, all subjects showed a rapid decrease of both impedance components at all frequencies. Middle-ear attenuations calculated from the magnitude of the acoustic impedance, together with previously obtained equal-loudness contours for the participating subjects, support the hypothesis that equality of loudness between two tones is attained when both generate the same total number of neural impulses within about 200 msec. The decrease in impedance at the highest levels is attributed to subharmonic radiation from the eardrum and/or a shift in the axis of rotation of the ossicles.

A68-81151
THE HUMAN EYE-MOVEMENT MECHANISM.
Gerald Cook (U.S. Air Force Acad., Frank J. Seiler Res. Lab., Colo.) and Lawrence Stark (Ill., U., Presbyterian-St. Luke's Hosp., Dept. of Bio-Med. Eng., Chicago).
Archives of Ophthalmology, vol. 79, Apr. 1968, p. 428–436. 13 refs.
Grants PHS NB-3055-04, PHS NB-3090-04, and PHS MH-06175-02.

A mathematical model for the human eye-positioning mechanism is presented. The derivation of the model is outlined briefly. Experiments for obtaining actual eye-movement behavior are described. Model simulations and comparisons of these results with experimental results are presented. The comparisons support the validity of the model. The physical basis of the model adds meaning to the model and insight into the operation of the actual system.

A68-81152
THE FIRST AEROMEDICAL EVACUATIONS OF CASUALTIES FROM RUSSIAN FRONT LINE OCTOBER–NOVEMBER 1941 [I PRIMI SGOMBERI CON MEZZI AEREI DI FERITI DALLA LINEA. FRONTE RUSSO (OTTOBRE–NOVEMBRE 1941)].
M. Mozzetti–Monterumici.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 313–317. In Italian.

The Author, in 1941, as captain of the Medical Corps, and director of the 159th divisional field hospital of the 3rd Celere, was charged to organize the evacuation of wounded people from the fire line to Putilowka airfield (Stalino), and from here to Dniepropetrowsky with S.81 airplanes. The Author shortly summarizes the bloody events of the brave Chiaramonti column, surrounded at Sseliesnoje, with several hundreds of wounded people (about 800 in all, evacuated in about ten days) and adds a few technical considerations.

A68-81153
MAN-MACHINE SYSTEMS IN AIR FORCE PROFESSIONAL ACTIVITIES [I SISTEMI UOMO-MACCHINA NEL QUADRO DELLE ATTIVITA'PROFESSIONALI MILITARI AERONAUTICHE].
M. Strollo.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 411–421. In Italian.

The problems of the relations taking place between man and machine during work is examined under the particular aspect of the Air Force. In the field of attitude perspectives specific for flight, there are in fact, differences related to the numerous professional roles connected to machine differences. It is enough to consider how two aircraft, at the ends of the varied range of military operations, can differ: the helicopter (rotating wing machine) and the other aircraft (fixed wing machines). The most interesting considerations from a medical standpoint are reflected specifically on the evaluation of attitudes and interests, of pilots. Technicians closely connected to flight systems such as in telecommunications, radio-assistance, air traffic control are also evaluated. Many considerations dealing with attitudes and interests, can be placed in the general aspect of efficiency and adaptation. It is necessary, however, to state a key point of human factors in man-machine systems. This point is the apprehension and consolidation of so-called perceptive-motor automatisms. Mechanisms supervising the most efficient settling of these automatisms with particular emphasis on maintenance of vigilant attention by the pilot in flight missions, represent one of the aspects of interest in connection with the other flying personnel and technicians.

A68-81154
PSYCHOTECHNICS AND PREVENTIVE OCCUPATIONAL MEDICINE IN MODERN MILITARY APPLICATIONS [LA PSICOTECNICA E LA MEDICINA PREVENTIVA DEI LAVORATORI NELL'AMBITO DELLE APPLICAZIONI MILITARI AERONAUTICHE].
M. Strollo.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 277–287. In Italian.

In view of the technical progress in general and its application to military medicine in particular the first step to consider is the enlistment-selection in compulsory military service. All of this field is directly related to the technological and mechanical development of the military activities. Psychotechnology can be in practice, identified with psychology applied to work connected with machines, and be related to preventive occupational medicine. In fact the machines can't function without men, who must learn quickly to handle them, after understanding identification and assimilation of sequences. These processes require particular energy and high mental concentration. On this base the importance of psychological aptitudes can be understood. Because of this, the energies of the individual are focused at the utmost, and are the elements able to discriminate the individuals in respect to the tasks being carried out. The applications of psychotechnics, although not comparable to neurology, add to the medical field a more severe and a complete scientific method and guarantee deontological principles that protect man's health. This patrimony of the individual, in the large range of professional requirements that man matches, must be considered under the extensive aspect of the values to be

protected, considering the highest ideals, particularly in military applications.

A68-81155
AIR SICKNESS PREVENTION IN PILOTS [SULLA PREVENZIONE DEL MAL D'ARIA NEI PILOTI].

C. Borghesan and R. Caporale (Centro di Studi e Ric. di Med. Aeron. e Spaziale; Ispettorato di Sanita' Aeron.; and Rome, U., Clin. Otorinoloringoiatrica, Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 374–397. 43 refs. In Italian.

The most recent studies on air sickness pathogenesis were surveyed in order to understand the therapeutic utility and efficiency of some drugs used at the present. Results of some tests, now in use or under experiment, to be used in preventive screening of individuals predisposed to air sickness were also examined. This study was carried out to show to aviation medicine specialists the methods presently available to prevent a relatively large number of applicant pilots from being disqualified in their advanced flight training. The importance of vestibular proprioceptors was pointed out. The reticular system, at the present considered the most important control apparatus of the central nervous system, as well as the conduction and integration center of all the sensory stimuli, was indicated as the pathogenetic mechanism center of motion sickness. The impossibility of excluding airsickness predisposed individuals with only the vestibular tests was noted. The results of treatment with some drugs, as well as of some laboratory methods used at present in airsickness prevention in pilots were also discussed.

A68-81156
QT DURATION CHANGES IN EXERCISE ELECTROCARDIOGRAM [MODIFICAZIONI DELLA DURATA DELL'INTERVALLO QT NELL'ELETTROCARDIOGRAMMA DURANTE LAVORO MUSCOLARE].

E. Busnengo and P. Rota (Centro di Studi e Ric. di Med. e Spaziale and Ispettorato di Sanita' Aeron., Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 398–406. 15 refs. In Italian.

The QT duration changes of an electrocardiogram were studied before, during and after a steady muscular exercise performed on a bicycle ergometer at ten kgm./sec./ten min. in 20 healthy jet pilots, aged 24 to 47 yr. The results were statistically analyzed and were compared with normal QT values calculated according to the Bazett method as modified by Goldberger. Some considerations were formulated on the physiological significance of this parameter, and its study was suggested as a further method of evaluating cardiac responses in muscular exercise tests.

A68-81157
INTERPRETATION OF FRACTURE MECHANISM IN PILOTS EJECTED, MAINLY IN REGARD TO F 104 G AIRCRAFT [INTERPRETAZIONE SUI MECCANISMI DI FRATTURA IN PILOTI DI AVIOGETTI, EJETTATI CON IL SEGGIOLINO, CON PARTICOLARE RIGUARDO AGLI F. 104 G.].

P. Italiano (Ist. Med.-Legale per l'A.M. "A. Mosso", Milan, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 407–408. In Italian.

Traumatic lesions due to pilot ejection were described. Among these were lower limb fractures typical of bail out, although worsened by ground impact. The cases, presented in a large number, concerned in particular vertebral fractures from F 104 G ejection. This lesion was reported in five out of six ejected pilots. This lesion was mainly located in the 12th dorsal vertebra, and was defined as typical spine fracture from bail out. The ejection seat of Air Force jet planes was examined and the vertebral lesion was connected partly with ejection impact acceleration and partly with the spine position when the pilot holds the "D" handle of the F 104 G. It was suggested that the ejection system be moved to a different position.

A68-81158
ELECTRONYSTAGMOGRAPHIC STUDY OF MAN SUBMITTED TO COMPLEX ACCELERATION [RICERCA ELETTRONISTAGMOGRAFICA NELL'UOMO SOTTOPOSTO AD ACCELERAZIONI "COMPLESSE"].

E. De Francesco, R. Caporale, and G. Mazza (Centra di Studi e Ric. di Med. Aeron. e Spaziale; Ist. Med.-Legale dell'A.M. "Aldo di Loreto"; and Ispettorato di Sanita' Aeron., Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 145–159. 9 refs. In Italian.

The hypothesis of a relationship between otolithic stimuli and semicircular canals responses seems to be corroborated by studies of numerous researchers. Nevertheless experimental conditions appear, so far, to involve only a few aspects of the extensive subject of complex acceleration. In order to study the effects of mild centripetal acceleration on nystagmus caused by variable angular acceleration (0.5°–1°–1.5°–3° sec.$^{-2}$), a few subjects underwent, by means of Toennies chair, modified for this purpose rotatory stimuli, with their head respectively at the axis of the rotating system, 15 and 30 cm. from the axis, and having both labyrinths at the same distance from the axis. The latency time, nystagmic response duration, number and amplitude of oscillations slow phase velocity, vertigo severeness were studied. The results obtained point out a higher excitability of the vestibular apparatus stimulated at 15 cm. from the rotation axis. Therefore the hypothesis of the existence of a point of maximum vestibular excitability eccentric rotary stimulation with short radium, beyond which an increase of centripetal acceleration resulted in a gradual decrease of excitability, seemed to be confirmed.

A68-81159
CLINICAL AND MEDICO-LEGAL CRITERIA IN ENLISTMENT OF AIR FORCE TECHNICIAN APPLICANTS [CONSIDERAZIONI SUGLI ATTUALI CRITERI CLINICI SEGUITI NELL'A.M. CIRCA L'ARRUOLAMENTO DEGLI ALLIEVI SPECIALISTI].

U. Durante.

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 269–273. In Italian.

Physical and laboratory methods of medical examinations of applicants used by Technicians School Medical Boards in Caserta are surveyed. The good results obtained are stressed, having compared the physical evaluation issued by these Boards with the medical conditions of the students during the courses. Nevertheless it was noted that there is no specific examination to evaluate the tolerance of organs and systems to different industrial toxins used in their work. It was suggested that the examination be adopted.

A68-81160
CRITIQUE OF VOCAL ACOUMETRY TEST [CRITICA DELLA ACUMETRIA VOCALE].
T. Marullo, G. Mazza, and F. Bianchi (Ist. Med.-Legale per l'A.M. "A. Di Loreto", Rome, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 274–276.

The vocal acoumetry test is considered by the laws and regulations of most countries, to be substantially reliable in the medico-legal evaluation of auditive capability. This test assumes that the comprehension of phonemes pronounced by the examiner will be perceived by the examinee with relation to the distance in a ratio depending on the law of sound propagation in a free space. After a review of the regulation enforcement in Italy and abroad, it was shown that this test is unreliable and several causes of error were reported. Besides the impossibility of comparing tests carried out by different examiners it was shown that, in usual environmental conditions, sound intensity level is independent of the test distance. Therefore the causes of phoneme comprehensibility changes in the effects of reverberated energy, due to the stimulus as well as to environment condition were indicated. This energy is independent of the examiner.

A68-81161
RARE CASE OF TRAPEZIUM FRACTURE FROM DIRECT TRAUMATISM ASSOCIATED WITH CARPAL SCHAPHOID FRACTURE [SU UN RARO CASO DI FRATTURA DEL TRAPEZIO DA TRAUMA DIRETTO ASSOCIATA A FRATTURA DELLO SCAFOIDE CARPALE].
E. Sepe and A. Costanzo.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 306–311. 14 refs. In Italian.

A short survey on the incidence of trapezium and carpal scaphoid fractures, and both direct and indirect fracture mechanisms, is made. An uncommon case is then reported of a trapezium fracture associated with scaphoid fracture in a young Air Force technician. The treatment, as well as the medico-legal aspects of an inadequate treatment was discussed.

A68-81162
ALTERNATING AND TRANSIENT WOLFF-PARKINSON-WHITE SYNDROME IN A MILITARY PILOT. A PATHOGENETIC AND CLINICAL STUDY [SINDROME DI WOLF-PARKINSON-WHITE ALTERNANTE E TRANSITORIA IN UN PILOTA MILITARE. STUDIO PATOGENETICO E CLINICO].
S. Castorina (Ist. Med.-Legale per l'A.M. "A. Mosso", Milan, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronaútica e Spaziale, vol. 29, Suppl., Dec. 1966, p 255–268. 15 refs. In Italian.

An alternating and transient Wolff–Parkinson–White (WPW) syndrome was unexpectedly recorded in an officer pilot flying light airplanes during the annual control examination. The officer carried out for long time a normal flight activity, and had previously only normal electrocardiogram (ECG) and physical findings. This very uncommon variety of WPW syndrome has, in this case, a more particular side because of the paradox response to exercise: disappearance of normal QRS waves, instead of pathological ones (as to be expected on the basis of neurovegetative mechanisms improving normal conduction, and activated by exercise). In this respect WPW syndrome pathogenesis was studied, surveying the most reliable theories. In conclusion the clinical aspects of WPW syndrome are investigated, considering the unfavorable effects on flight qualification of candidate pilots, as well as the efficiency of medico-legal implication on pilots suffering from this syndrome.

A68-81163
THE HETEROAGGLUTINATION OF HOYT AND MORRISON AND TRANSAMINASES IN APPARENTLY HEALTHY MILITARY PILOTS [ETEROAGGLUTINAZIONE DI HOYT E MORRISON E TRANSAMINASI IN PILOTI APPARENTEMENTE SANI].
O. Zardi, G. Nobili, and N. Vescia (Rome, U., Ist. di Igiene and Ist. Med.-Legale l'A.M. "Aldo di Loreto", Rome, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivistá di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 288–292. In Italian.

Six hundred fifty-six individuals were examined, through transaminases and heteroagglutination of Hoyt and Morrison titrations. The results obtained in apparently healthy people were compared with the ones obtained in sick individuals. Four hundred ninety-five, out of 656 studied, were itinerant Air Force personnel, 115 were hospitalized at the OORR in Rome, for the following diseases: hepatic insufficiency 30, cirrhosis 40, cancer of liver 16, leukemia 20, Hodgkin disease 9, 46 under clinic treatment for visual damages due to Toxoplasma infection. Some considerations can be drawn from the results, on the diffusion of viral hepatitis infection, that show the positivity percentage, in apparently healthy subjects, has to be related to a previous infection, without disease or with unapparent clinical signs. The high percentage positivity in cirrhosis has to be related to the viral etiology of this disease. The positivity, in the other groups of patients is nearly the same as in apparently healthy people.

A68-81164
IMPORTANCE OF CLINICO-RADIOLOGICAL STUDY OF SPINAL COLUMN IN FLYING PERSONNEL SELECTION [IMPORTANZA DELL'INDAGINE CLINICO-RADIOLOGICA DELLA COLONNA VERTEBRALE NELLA SELEZIONE DEL PERSONALE AERONAVIGANTE].
A. Cicala.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 293–303. 20 refs. In Italian.

Through clinico-radiological examinations, the spinal columns of more than 100 subjects, both pilots and other air force personnel, aged 20 to 45 yr., was studied. This research ascertained that small congenital and acquired anomalies of the spinal column, particularly of the lumbosacral tract, consequent on flying activity, predisposes the spine to pathological and structural changes, often flight disqualifying. Attention is called to the importance of the clinico-radiological study of the spine in the selection of flying personnel.

A68-81165
FIRST RESULTS OF FUNCTIONAL TEST IN SELECTED FLYING PERSONNEL [PRIMI RISULTATI DI PROVE FUNZIONALI SU PERSONALE AERONAVIGANTE SELEZIONATO].
G. Janigro and D. Russo (Centro di Studi e Ric. de Med. Aeron. e Spaziale and Ispettorato di Sanita' Aeron., Rome, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 224–240. 17 refs. In Italian.

The results of functional tests carried out in routine control examinations of the flying personnel on active duty, (age 24 to 47 yr.), were studied in order to show the changes associated with

age in respiratory and cardiovascular responses of healthy subjects. The recorded mean values of vital capacity, and its fractions, as well as the timed vital capacity were fairly higher than the theoretic ones. The volumes decrease progressively with age, matching a parallel increase of residual volume and the ratio of residual volume to total lung capacity. A slow decrease in oxygen intake at rest and during muscular exercise and the calories/pulmonary ventilation ratio (according to Margaria) was also noted, whereas an increase of pulmonary ventilation and blood pressure was present during exercise. These changes in healthy subjects, could be attributed to a natural anatomical and functional aging process. Therefore flight activity, even strenuous and difficult could not cause *per se* markable anatomical and functional changes of the respiratory and cardiovascular apparatus.

A68-81166

COLOR VISION EXAMINATION IN SELECTION OF AIR FORCE PERSONNEL: PRACTICAL CONSIDERATIONS [CONSIDERAZIONI PRATICHE SU DATI RILEVATI DALL'ESAME DEL SENSO CROMATICO IN SEDE DI SELEZIONE DEL PERSONALE AERONAUTICO].

C. Terrana (Ist. Med.-Legale per l'A.M. "A. Di Loreto", Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 139–144. In Italian.

Some considerations of practical interest are reported on data obtained from color vision examinations in Air Force personnel selection. In particular the relation is considered between dyschromatopsia severity and type, and the results of the Farnsworth test, of Ishihara tables reading and of color discrimination by transparence with the Beyne chromoptometric lamp. After having denied a constant relation between the type of dyschromatopsia and Beyne chromoptometric lamp results, protanopia is considered, in general, as the color blindness more severely affecting transparence color discrimination, and therefore the less compatible in selection. The deuteranopia, another classic and frequent dyschromatopsia, generally affects lamp color vision less severely. Also with regard to chromato-anomalies, protanomaly seems to affect transparence color vision more than deuteranomaly.

A68-81167

VESTIBULAR TESTS AND TILT TEST COMPARISON [RAFFRONTO TRA I RISULTATI DELLE PROVE VESTIBOLARI E DELLE PROVE DEL TRAVOLO RIBALTABILE].

P. P. Castagliuolo and A. Aurucci (Ist. Med.-Legale per l'A.M. "G. Gradenigo", Naples, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 241–252. 21 refs. In Italian.

Tilt table tests are given to applicant pilots during their psychophysiological screening in order to study cardiovascular adaptation to moderate positive acceleration. Common trends show no changes or small increases in blood pressure and increases of heart rate at +65°, and no changes or small decreases in blood pressure and bradycardia at −65°. An opposite trend shown by a small percentage of individuals is ascribed to a mild sympathetic disfunction, not flight disqualifying. Results from tilt table tests and those obtained with other routine tests used in pilot selection were compared. The vestibular test disqualifies individuals with organic and severe functional labyrinth damage, through the study of normal and excited reactions, mainly by using electronystagmography. These individuals show abnormal reactions such as hyperreflexia, hyporeflexia, arelexia and asymmetry. Apart from these clearly disqualifying results, electronystagmography may record borderline results not flight disqualifying. In applicant pilot reserve officers submitted to both tests, ten individuals were found with the above reported vestibular responses. In six of these, tilt table tests gave borderline results. Two other subjects who showed disfunctions in the tilt table test gave normal responses to the vestibular test. Both tests proved valid for use in the selection of flight personnel.

A68-81168

METABOLIC ADAPTATIONS TO CHRONIC HEAT EXPOSURE IN THE GOLDEN HAMSTER.

Yair Cassuto (Negev Inst. for Arid Zone Res., Dept. of Environ. Physiol., Beer-Sheva, Israel).

American Journal of Physiology, vol. 214, May 1968, p. 1147–1151. 8 refs. Israel Council for Res. and Develop. supported research.

Metabolic rates of heat-acclimated hamsters, are lower than those of controls over a wide scale of ambient temperatures. The tolerance of heat-acclimated animals increases on exposure to high environmental temperatures and decreases on exposure to lower temperatures. In correlation with the reduced metabolic rates a decreased respiratory activity of isolated liver mitochondria is observed. This reduction starts after one day and reaches its maximum after between two to five days of heat exposure. It was observed that after heat acclimation there is increased sensitivity of isolated mitochondria and of intact animals to the effect of uncouplers on the respiratory rate. It is suggested, therefore, that during the acclimation period certain modifications of the respiratory chain take place which reduce the heat production of heat-acclimated animals.

A68-81169

EVAPORATIVE WATER LOSS FROM RATS IN THE HEAT.

F. Reed Hainsworth (Pa., U., Inst. of Neurol. Sci. and Dept. of Biol., Philadelphia).

American Journal of Physiology, vol. 214, May 1968, p. 979–982. 16 refs.

Grants PHS NB 03469-04 and PHS 5 T01 Gm 281.

In rats in the heat water lost through saliva is the major component of evaporative water loss. Total evaporative water loss was measured from normal and desalivated rats and salivary evaporative water loss was then estimated as the difference in evaporation between normal and desalivated rats. Above 32°C. the salivary evaporation gradually increases up to 44°C. which was the highest experimental temperature. At 44°C. males and females evaporated similar amounts, but below 44°C. males evaporated more salivary water. In desalivated rats evaporative water loss was much smaller, but it likewise increased with ambient temperature. Comparisons are made with other rodents, and water losses are related to other responses reported for rats under heat stress.

A68-81170

WATER METABOLISM OF RATS IN THE HEAT: DEHYDRATION AND DRINKING.

F. Reed Hainsworth, Edward M. Stricker, and Alan N. Epstein (Pa., U., Inst. of Neurol. Sci. and Dept. of Biol., Philadelphia).

American Journal of Physiology, vol. 214, May 1968, p. 983–989. 28 refs.

Grants PHS NB 03469-04 and PHS 5 T01 Gm 281.

Normal and desalivated rats were exposed to elevated ambient temperatures and their thermal tolerance, evaporative water loss, tissue dehydration, and drinking were studied. At 40°C. with no water available normal rats became hyperthermic (40–41°C.) and increased evaporation by spreading saliva on their fur and skin. The saliva was initially derived from plasma, whose volume decreased by 11.3% in the first hr. of exposure but was subsequently maintained by losses from other tissues. Evaporation continued for three to five hr., until heat exhaustion occurred. At this time plasma volume fell precipitously and body temperature rose to lethal

levels. Adequate evaporation was thus prerequisite for survival, and some rats which did not spread saliva were intolerant to heat stress. When water was available, normal rats showed increased drinking with increasing temperatures, and their intakes approximated their losses. Intravascular and intracellular dehydration secondary to salivary water loss appeared to be the necessary stimulus for drinking in the heat. Desalivated rats, which could not spread saliva, did not become dehydrated in the heat and did not drink despite severe hyperthermia and a dry mouth.

A68-81171
EFFECTS OF EPINEPHRINE, STRESS, AND EXERCISE ON INSULIN SECRETION BY THE RAT.

Peter H. Wright and Willy J. Malaisse (Ind. U., Med. Center, Dept. of Pharmacol., Indianapolis).

American Journal of Physiology, vol. 214, May 1968, p. 1031–1034. 29 refs.
Grants PHS AM-07211 and PHS 1 F05 TW-865-02.

Rats were injected with guinea pig anti-insulin serum and ^{125}I-labeled human serum albumin. After 45 min., intermittent electrical shocks were applied; epinephrine was injected subcutaneously; or the animals swam in tepid water. All animals were killed at 75 min. Compared with endogenous insulin secreted in control animals between 45 and 75 min., significantly less secretion was observed in the three groups of treated rats. It is suggested that endogenous epinephrine released during stress or exercise is sufficient to suppress insulin secretion even under conditions of hyperglycemia.

A68-81172
COMPARISON OF METABOLIC RESPONSES OF RATS TO HYPOXIC STRESS PRODUCED BY TWO METHODS.

Jane A. Russell and Lynn Crook (Emory U., Div. of Basic Health Sci., Dept. of Biochem., Atlanta, Ga.).

American Journal of Physiology, vol. 214, May 1968, p. 1113–1116. 21 refs.
Grants PHS 5-F1-GM-22,164-01, PHS 5-F1-GM-22,164-02, and PHF 5-F1-GM-22,164-03.

The objectives of the present report were the study of metabolic responses to graded hypoxic stress of 24 hr. duration in fasted intact rats and a comparison of the responses obtained when hypoxia was produced by either reduced total pressures or oxygen–nitrogen mixtures. Urinary total and urea nitrogen excretion, blood lactic acid concentration, and serum urea concentration increased linearly with decreasing P_{O_2}. Liver glygocen and blood glucose concentrations increased with decreasing P_{O_2}, but increased much more rapidly below a P_{O_2} of 84 mm. Hg, resulting in a sixfold increase in liver glycogen and a 40% increase in blood glucose concentrations at a P_{O_2} of 63 mm. Hg. The increased total nitrogen excretion was shown to be adequate to account for the increase in liver glycogen content. Urinary ammonia nitrogen excretion was minimal at a P_{O_2} of 84 mm. Hg. Urinary and serum allantoin did not vary with changes in P_{O_2}. The results were found to be identical when rats were exposed to either reduced total pressures or oxygen–nitrogen mixtures.

A68-81173
TOXOPLASMA GONDII INFECTION IN TRAVELING MILITARY PERSONNEL [INFEZIONE DA TOXOPLASMA GONDII IN CAMPIONE DI PERSONALE MILITARE VIAGGIANTE].

O. Zardi, G. Venditti, and G. Nobili (Rome, U., Ist. di Igiene and Ist. Med.-Legale per l'A.M. "Aldo di Loreto", Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 443–447. In Italian.

Epidemiological research was carried out by means of immunoserum tests for toxoplasmosis on 1,108 Italian individuals, air crew members and 42 Central African pilots submitted to ordinary or extraordinary medical control at the Medico-legal Institute of Rome. The results obtained show the large extent of toxoplasmosis infection, particularly influenced by cohabitation with domestic animals and the use of undercooked meat. Moreover the percentage of positive results was higher in flying personnel coming from Central Africa, regardless of their living habits.

A68-81174
EFFECTS OF GROWTH HORMONE AND CORTISOL ON ENDOCRINE-DEFICIENT RATS SUBJECTED TO HYPOXIA.

Lynn Crook and Jane A. Russell (Emory U., Div. of Basic Health Sci., Dept. of Biochem., Atlanta, Ga.).

American Journal of Physiology, vol. 214, May 1968, p. 1117–1121. 9 refs.
Grants PHS 5-F1-GM-22,164-01, PHS 5-F1-GM-22,164-02, and PHS 5-F1-GM-22,164-03.

The objective of the present report was the study of metabolic responses to hypoxic stress of 24 hr. duration in fasting adrenalectomized and hypophysectomized rats. Fasted adrenalectomized rats, subjected to hypoxia and given cortisol, had increased urinary total and urea nitrogen excretions that were proportional only to the dose of cortisol. Liver glycogen and blood glucose concentrations increased with both reduced P_{O_2} and dose of cortisol. Urinary allantoin excretion and serum allantoin and urea concentrations increased slightly with increased cortisol while serum inorganic phosphorus and blood lactic acid concentrations were increased by reduced P_{O_2} only. In fasted hypophysectomized rats subjected to a P_{O_2} of 84 mm. Hg and given both cortisol and growth hormone, liver glygocen concentrations were increased fourfold above those of similarly treated rats at a P_{O_2} of 155 mm. Hg, or of rats receiving cortisol only. Blood glucose and gastrocnemius and heart glycogen concentrations were dependent only on the dose of cortisol. In rats receiving cortisol, growth hormone induced similar increases in serum free fatty acid concentrations after six hr. at a P_{O_2} of both 155 and 84 mm. Hg. Blood lactic acid and serum inorganic phosphorus concentrations increased slightly with decreased P_{O_2}. Urinary total, urea, allantoin, and ammonia nitrogen excretions were variable.

A68-81175
BLOOD PRESSURE DURING SLEEP IN THE RHESUS MONKEY, BEFORE AND AFTER STRESS.

Johann Stoyva, Ralph P. Forsyth, and Joe Kamiya (Colo., U., Med. School, Dept. of Psychiat., Denver and Calif., U., San Francisco Med. Center, Cardiovascular Res. Inst. and Dept. of Psychiat., San Francisco).

American Journal of Physiology, vol. 214, May 1968, p. 1122–1125. 9 refs.
Grants PHS HE-06285, PHS 5TIMH-7082, PHS FR-00122, and PHS 1-K3-HE-12,974-02 (RPF)

During rapid-eye movement (REM) sleep in two rhesus monkeys, systolic and diastolic pressures were consistently lower and more variable than during matched samples of high-voltage (HV) slow-wave sleep. Pulse rates were higher and much more variable. Blood pressures and pulse rates were significantly lower in both REM and HV sleep during nights which followed work on avoidance schedules. The variability, but not the magnitude, of blood pressure in these "post-stress" REM periods remained greater than that of the HV periods. Pulse rates were, again higher and much more variable. The decline of blood pressures during the transition from wakefulness to the first episode of HV sleep was considerably less than the more abrupt decrease which occurred when HV sleep changed to REM sleep.

A68-81176
ETIOLOGICAL CONSIDERATIONS IN NEONATAL MORTALITY AMONG RATS AT MODERATE HIGH ALTITUDE (3,800 M).
Fenton C. Kelley and Nello Pace (Calif., U., Dept. of Physiol.-Anat., Berkeley).
American Journal of Physiology, vol. 214, May 1968, p. 1168–1175. 29 refs.
NASA Grant NsG-397 and Contract Nonr 3656(25).

Sea level rats were taken to altitude and mated. Fertility was not significantly different from that at sea level; however, 15% of the fetuses were markedly stunted. Litter size was smaller at altitude than at sea level, and a mortality rate of 20% occurred during the first ten days postpartum. Raising the ambient relative humidity at altitude halved the cumulative ten-day mortality. At ten days of age altitude pups weighed 30% less than sea-level controls. Lactational competence of the nursing mothers at altitude was unimpaired as judged from the dry, fat-free weight of the mammary tissue, together with its total DNA and RNA content. Weights of stomach contents of neonates were equal to or greater than those measured at sea level. Marked hematological differences were noted between altitude and sea level neonates. Liver glygocen content of one-day old altitude pups was one-third that at sea level. Heart and spleen sizes were significantly larger in the altitude neonates. These observations indicate that at moderate altitude fetal hypoxia occurs in utero, leading to some fetal mortality and reduced viability among the newborn. The low relative humidity at altitude appears to be a major factor in postpartum mortality. However, the hypoxia seems equally important in neonates, apparently acting to interfere with normal intermediary metabolism of carbohydrate, fat, and protein.

A68-81177
ATTITUDES AND INTERESTS IN STUDYING PERSONALITY, IN REGARD TO PROFESSIONAL EFFICIENCY AND ADAPTATION [ATTITUDINI ED INTERESSI NELLO STUDIO DELLA PERSONALITA' AI FINI DEL RENDIMENTO E DELL'ADATTAMENTO PROFESSIONALE].
M. Strollo.
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 102–115. In Italian.

Professional efficiency and adaptation were considered in relation to occupational preventive medicine and in relation to each other. Attitudes and interests were considered with respect to efficiency in a given professional activity. It was concluded that interests and attitudes must harmonize for efficiency in and adaptation to work.

A68-81178
ACUTE HYPERBARIC OXYGENATION. PRELIMINARY NOTE ON VARIATIONS OF ELECTROCARDIOGRAMS, SOME SERUM ENZYMATIC SYSTEM, BLOOD SUGAR LEVEL, ATP ACID AND HISTOLOGICAL EXAMINATION OF SOME ORGANS OF RABBITS SUBMITTED TO THREE ABSOLUTE ATMOSPHERES [L'OSSIGENAZIONE IPERBARICA ACUTA. NOTA PREVENTIVA SUL COMPORTAMENTO DELL'ECG, DI ALCUNI SISTEMI ENZIMATICI SERICI, DELLA GLICEMIA E DELL'ATP, NEL CONIGLIO SOTTOPOSTO A 3 ATMOSFERE ASSOLUTE, E CONTROLLI ISTOLOGICI IN VARI ORGANI].
C. Vacca, P. De Franciscis, L. Vacca, and L. Causa (Ist. Med.-Legale per l'A.M. "G. Gradenigo", Naples, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 430–442. 6 refs. In Italian.

Rabbits submitted to three atma. hyperbaric oxygen were studied, taking into consideration changes of electrocardiograms (ECG), blood enzyme systems (lactic acid dehydrogenase, aldolase, GOT, GPT), ATP and blood sugar levels, as well as histological studies of heart, kidney, lung, spleen, adrenal glands and central nervous system tissues. The changes observed were thought to be related, to hyperoxic stress, as well as to changes of cell membrane permeability due to hyperoxia *per se*. Besides the pulmonary epithelium, heart muscle cells also were very easily affected, since early ECG signs of polarization and depolarization variations were reported due to permeability changes of muscular cells to ions and enzymes. The enzymatic–electrolytic imbalance, related to changes of cell membrane permeability chiefly in the heart and the central nervous system, clearly explains the well known hyperoxia toxic syndrome. Research on cellular electrolytes and electron microscopy studies are definitively proving the interesting hypothesis presented in this preliminary research.

A68-81179
CHANGES OF HEART AND ELECTRIC AXIS POSITIONS IN DIFFERENT BODY POSITIONS [VARIAZIONI DI POSIZIONE DEL CUORE E DELL'ASSE ELETTRICO CARDIACO NELLE VARIE POSIZIONI CORPOREE].
E. Busnengo and F. Rossanigo (Centro di Studi e Ric. di Med. Aeron. e Spaziale and Ispettorato di Sanita' Aeron., Rome, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 117–127. 20 refs. In Italian.

The relationship between the electrocardiogram (ECG) axis and heart position changes was investigated in ten healthy subjects, aged 20 to 35 yr. The studies were carried out by means of teleroetgenography and a tilt table. The data from ECG, x-rays, heart rate, blood pressure, respiratory rate and pulmonary ventilation were recorded at +65° head up, −65° head down and at horizontal positions. It was concluded that the tilt table test is a valuable method for selection of flying personnel, and as a measure of physical fitness.

A68-81180
COMPARISON OF RESULTS OF TESTS OF STRENUOUS MUSCULAR EXERCISE CARRIED OUT AT CYCLO-ERGOMETER, BY THE SAME SUBJECTS, AFTER 18 MONTHS [RAFFRONTO FRA I RISULTATI DI PROVE DI LAVORO MUSCOLARE PESANTE ESEGUITE AL CICLOERGOMETRO DAGLI STESSI SOGGETTI A DISTANZA DI 18 MESI].
A. Aurucci (Ist. Med.-Legale per l'A.M. "G. Gradenico", Naples, Italy).
(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).
Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 128–138. 10 refs. In Italian.

Strenuous muscular exercise tests were repeated in a group of 68 individuals 18 mo. after the first tests during psychophysiological selection of military pilots. The second test gave nearly unmodified results in respect to the first one. Only VO_2/heart rate ratio changed noticeably, showing a better physiological efficiency, likely because of physical and sporting activities carried out in between the two test performances. The results corroborate muscular exercise test validity in studying cardiac and respiratory functions, and the VO_2/heart rate ratio is shown to be a useful parameter to evaluate training condition.

A68-81181
STUDY OF THE VERTEBRAL COLUMN IN FLYING PERSONNEL SELECTION [LO STUDIO DEL RACHIDE NELLA SELEZIONE DEL PERSONALE NAVIGANTE].

E. Cavazzini and G. Albo (Rome, U., Ist. di Clin. Ortoped., Italy). *(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).*

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 448–459. 7 refs. In Italian.

The flying duty of military pilots involves mechanical stresses on the skeletal apparatus, particularly on the vertebral column, due to the high speeds attained by aircraft. These stresses are of remarkable intensity and act discontinuously. Often the maximum tolerance limits of the vertebral column are reached, especially in emergencies such as in seat ejection. In these cases, in fact, fractures are frequent, and can only be avoided by observing procedures to minimize traumas. It was suggested that a careful physical and X-ray examination of the spine of subjects that are going to start flying duty be made. Some congenital and acquired conditions must be considered, that may be missed in a routine examination. These conditions can precipitate severe damages, such as fractures, dislocations, spondylolisthesis, etc. At the least they can lead to premature flight unfitness due to lumbago, sciatica and disk hernia degenerative arthritis. A few clinical cases are reported. In conclusion the necessity of periodic control of the vertebral column, especially in pilots of supersonic aircraft submitted to the most severe stresses, was pointed out.

A68-81182

FLIGHT SURGEON'S PSYCHOLOGICAL ASSISTANCE IN FLIGHT SAFETY [L'ASSISTENZA PSICOLOGICA DA PARTE DEL MEDICO DI STORMO AI FINI DELLA "SICUREZZA" VOLO].

M. Strollo

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 422–429. In Italian.

The flight surgeon's psychological assistance is complex and it requires active participation in all phases of flying operations and personal relations with the flyers. The flight surgeon's assessment of the personality of a pilot is a product of his intuition and awareness, as well as his professional training. Through remarkable technological advances, the airplanes have become extremely complex, and this increases the demands placed on the flyers and does not help to elaborate the numerous situations and various problems created. A short survey of general problems, basic trends, as well as intervention methods can be a useful basic line to the flight surgeon for a better understanding of the extreme importance of his work in assisting the pilot. The work conditions, the environmental characteristics and the equipment used are studied from a professional point of view. The main task of a flight surgeon is to observe, study, evaluate the maturity and potential of pilots by personnal interviews, to administer to his psychological needs and be able to take preventive measures when needed.

A68-81183

NOMOGRAMS FOR THE CALCULATION OF OXYGEN CONSUMPTION WITH THE OPEN SYSTEM [NOMOGRAMME ZUR BERECHUNG DES SAUERSTOFFVERBRAUCHS MIT DEM OFFENEN SYSTEM].

C. Albers (Max-Planck-Ges., W. G. Kerckhoff-Inst., Bad Nauheim, West Germany).

Internationale Zeitschrift fur angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 80–88. In German.

The determination of oxygen consumption with the open system was expressed mathematically with equations for inspiratory measurement of the respiratory volume and for exspiratory measurement of the respiratory volume. Line charts were given for obtaining ΔO_2 from the exspiratory concentration of oxygen and carbon dioxide in air breathing. The respiratory volume was converted to standard conditions (STPD) by means of a factor f_o, depending on barometric pressure, ambient temperature and relative humidity. A line chart for f_o was also given. The calculation of the oxygen consumption was thus reduced to the simple expression $V_{O_2} = V \cdot f_o \cdot \Delta O_2 \cdot 10^{-2}$ which is especially convenient for non-steady-state experiments in climatic chambers.

A68-81184

REPRESENTATION OF BINAURAL STIMULI BY SINGLE UNITS IN PRIMARY AUDITORY CORTEX OF UNANESTHETIZED CATS.

Joseph L. Hall II and Moise H. Goldstein, Jr. (Johns Hopkins U., School of Med., Biomed. Eng., Baltimore, Md.).

Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 456–461. 25 refs.

PHS and USAFOSR supported research.

The stimulus-evoked activity of single units in the left primary auditory cortex (AI) of cats immobilized with gallamine triethiodide was observed as tone bursts, noise bursts, or clicks were presented at a moderate intensity to the right ear, to the left ear, and simultaneously to both ears. The right ear is represented more strongly in that more cells respond to monaural stimulation of the right ear than the left ear. An ear is said to be "represented" if a unit responds to stimulation of that ear, or if the response to stimulation of the other ear is modified by stimulation of that ear. There is extensive overlap of the populations of units representing the two ears; the population representing the left ear is almost completely contained within the larger population representing the right ear. The majority of units exhibited some form of binaural interaction. Binaural summation was the most common form of interaction; other units exhibited binaural inhibition or combinations of summation and inhibition.

A68-81185

PARACHUTE JUMPING AND PARATROOPERS PSYCHOLOGY [LE SAUT EN PARACHUTE ET LA PSYCHOLOGIE DES PARACHUTISTES MILITAIRES].

M. J. Teyssandier.

(Soc. Franc. de Physiol. et de Méd. Aéron. et Cosmonautiques, Meeting, Jun. 16, 1967).

Revue de Médecine Aéronautique et Spatiale, vol. 6, no. 24, 1967, p. 5–10. In French.

The French method of parachute jumping and the equipment used are described briefly. A psychological analysis of the parachutist reactions during the different phases of training on land and in the air is presented.

A68-81186

THE DEPENDENCE OF MAXIMAL OXYGEN DEBT IN MEN AND WOMEN ON THE CONDITION OF TRAINING [DIE MAXIMALE SAUERSTOFFSCHULD BEI MANNERN UND FRAUEN IN ABHANGIGKEIT VOM TRAININGSZUSTAND].

H. P. Millahn and I. Doscher (Rostock, U., Physiol. Inst., East Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 67–79. 20 refs. In German.

In trained and untrained men and women the maximal oxygen debt was measured after simultaneous arm and foot work to exhaustion in 40 to 90 sec. The average maximal oxygen debt was 17.2.1. in male athletes, 10.8 1. in female athletes, 12.6 1. in untrained men and 6.65 1. in untrained women. Relative to body mass the women athletes reached the same maximal oxygen debt as the male non-athletes. The maximal oxygen debt per kilogram of fat-free body mass was larger in the female athletes than in the male non-athletes. A significant correlation existed between the body mass, body surface, fat-free body mass and the maximal oxygen debt. The maximal value of oxygen consumption

measured during the recovery phase was presumed to be the oxygen consumption of the subject. True statistical correlations were established among maximal oxygen consumption, maximal oxygen pulse and the maximal oxygen debt.

A68-81187

INVESTIGATION INTO THE INFLUENCE OF ACTIVE AND PASSIVE PAUSES ON SEVERAL PHYSIOLOGICAL FUNCTIONS DURING AND AFTER PHYSICAL LOAD [UNTERSUCHUNGEN ZUM EINFLUSS DER AKTIVEN UND PASSIVEN PAUSEN GESTALTUNG AUF EINIGE PHYSIOLOGISCHE FUNKTIONEN WAHREND UND NACH PHYSICHER BELASTUNG].

Max Quaas and Manfred Lohs (Med. Akad. "Carl Gustav Carus", Inst. für Arbeitshyg., Dresden, East Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 60–66. 18 refs. In German.

The effects of various forms of physical exercise and the recovery interval on the circulation and metabolism in nine young men were investigated. Continuous loading with work of medium intensity with intermittent active and passive recovery periods was examined. The duration of work had no effect on the recovery processes of oxygen consumption and pulse frequency at six mkp./sec. for 30 min. Passive and active intervals affected the reduction of the oxygen debt in equal amounts. The pulse frequency showed a slight increase after intervals, which is expressed in lowered steady state values of the following loads. After active recovery periods, this was more strongly pronounced than after the passive recovery.

A68-81188

THE ARTERIAL BLOOD GASES AT REDUCTION OF OXYGEN CONCENTRATION IN INSPIRED AIR DURING PHYSICAL WORK [DIE ARTERIELLEN BLUTGASE BEI VERMINDERUNG DER SAUERSTOFFKONZENTRATION IN DER INSPIRATIONSLUFT WAHREND KORPERLICHER ARBEIT].

E. Doll, J. Keul, A. Brechtel, and H. Reindell (Freiburg im Breisgau, Med. Universitätsklin., West Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 46–59. 24 refs. In German.

Twenty-eight healthy men, aged 20 to 30 yr., were examined under hypoxic conditions during physical work. Oxygen pressure, oxygen saturation, pH and carbon dioxide pressure of the arterial blood were analyzed. The values for arterial oxygen pressure and arterial oxygen saturation decreased as the work load and degree of hypoxic conditions increased. Compensation mechanisms such as increased Hb-content during work or after lengthy periods at high altitude were unavoidably coupled with a reduction of the oxygen up-take of the arterial blood. At an altitude of 2,000 m., this results in a distinct limitation of physical capacity. At an altitude of 4,250 m. or in low oxygen mixture of 12.7%, the critical arterial oxygen pressure is reached; i.e. the oxygen supply to the working muscles reaches the critical level under these conditions. The decrease in oxygen pressure during work under hypoxic conditions is caused by insufficient oxygen diffusion in the lungs. The decrease in oxygen saturation is not caused by this alone; here pH reduction during stress also plays an essential role. The pH decrease during maximal physical work was equally great in normal air and in a low oxygen mixture of 15.9%, corresponding to 2,500 m. above sea level. However, in a low oxygen mixture of 12.7%, corresponding to 4,250 m. above sea level, the pH level decreased more sharply during maximal work.

A68-81189

PRACTICAL INDICES OF METABOLIC ACTIVITY: AN EXPERIMENTAL COMPARISON OF PULSE RATE AND VENTILATION.

R. J. Shephard (Toronto, U., School of Hyg., Dept. of Physiol. Hyg., Ontario, Canada).

Internationale Zeitschrift für angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 13–24. 15 refs.

Natl. Health and Welfare, Ottawa and Ontario Heart Found. supported research.

The possibility of predicting the oxygen consumption (V_{O_2}) of the individual from measurement of expired gas volume (V_E) and pulse rate (f) was tested (a) on a relatively homogenous population of sedentary young men, performing step and bicycle ergometer tests under well controlled environmental conditions in the laboratory, and (b) on a more diverse male population under less ideal conditions in an improvised field laboratory. Under laboratory conditions, predictions based on f were slightly more accurate than those based on $\dot{V}_E$, but in the field laboratory errors were similar whether $\dot{V}_E$ or f was used. Even under favorable conditions, individual estimates of $\dot{V}_{O_2}$ were in error by 5 to 10% of aerobic power. This margin of error, which is inevitably increased when predictions are extended to a less homogenous population under conditions of emotional or thermal stress, is too large to permit the use of either procedure to predict individual patterns of metabolic activity.

A68-81190

SINGLE-UNIT ACTIVITY IN THE PRIMARY AUDITORY CORTEX OF UNANESTHETIZED CATS.

Moise H. Goldstein, Jr., Joseph L. Hall II, and Bruce O. Butterfield (Johns Hopkins U., School of Med., Biomed. Eng., Baltimore, Md.).

Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 444–455. 24 refs.

PHS and USAFOSR supported research.

Activity of single cells in cats immobilized with gallamine triethiodide was recorded with metal microelectrodes and displayed by an on-line dot display. Tone burst, noise burst, click, and other stimuli at moderate intensities were presented through condenser microphones at both ears. Spontaneous activity ranged from less than one spike/sec. to greater than 40 spikes/sec. Almost all units were affected by acoustic stimuli, either by enchancement of activity, reduction of activity, or a combination. Units were affected at the onset and/or termination of a stimulus, throughout a stimulus, or a combination. Best frequency of units ranged from less than one kHz to greater than 50 kHz. Over half the units responding to tone bursts exhibited a response range greater than one-half oct. Some units had double response ranges. The pattern of response to tone bursts of some units changed as the frequency of the stimulus was changed. A minority of the units showed responses only to special stimuli such as swept tones or continuous noise or tones. It appears that the coding of the acoustic stimuli by single units of the primary auditory cortex of the cat is performed in a highly individualistic and variegated manner.

A68-81191

ON THE DAILY COURSE OF PHYSICAL CAPACITY [UBER DEN TAGESGANG DER KORPERLICHEN LEISTUNGSFAHIGKEIT].

E.-D. Voigt, P. Engel, and H. Klein (Marburg/Lahn, U., Inst. für Arbeitsphysiol. und Rehabilitationsforsch., West Germany).

Internationale Zeitschrift für angewandte Physiologie, vol. 25, Jan. 2, 1968, p. 1–12. 23 refs. In German.

Deut. Forschungsgemeinschaft supported research.

The daily course of the physical capacity in 20 healthy subjects was investigated through measurement of the capacity pulse index (CPI) every two hr. The CPI showed significant daily rhythmic fluctuations with a minimum at 2:00 a.m. and a maximum between 6:00 p.m. and 8:00 p.m. The mean individual amplitude amounted to 19.5% of the daily average. The minimum showed a dependence on the absolute value of the CPI. The pulse increase opposite the resting value was concerned with all loads during

daily fluctuations. In a calculation of the physical work capacity (PCW) 170 from the CPI, the terms of the maximal load pulse as well as the pulse frequency during rest was resolved. In an expanded group of 20 subjects the PWC 130 and 170 exactly at 3:00 a.m and 3:00 p.m. on various days were compared. A significant difference in the larger physical capacity was found during the night.

A68-81192
PSYCHOLOGICAL AND PHYSIOLOGICAL SELECTION OF AIR FORCE PERSONNEL. CONSIDERATIONS ON STATISTICAL AND CLINICAL FINDINGS OF APPLICANTS [SELEZIONE FISIOPSICHICA DEL PERSONALE AERONAUTICO CONSIDERAZIONI SU DATI STATISTICI E CLINICI OTTENUTI IN GRUPPI-CAMPIONE DI CANDIDATI].

A. Scano (Centro di Studi e Ric. di Med. Aeron. e Spaziale, Rome, Italy) and G. Ruggieri (Ist. Med.-Legale per l'A.M. "A. Di Loreto", Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 23–71. 102 refs. In Italian.

The report is divided into three parts: (1) updating information and present trends of Air Force personnel selection; (2) showing statistical data calculated from numerous physiological parameters and physical findings recorded in over 4,000 examinations and functional tests carried out in the AF Medico-legal Institute of Rome and in the AF Aerospace Medicine Center of Rome; and (3) pointing out and discussing possible improvements and simplifications of examinations. In part one a survey is made of regulations issued by ICAO and some countries for selecting flying personnel. The principles forming the new psychological and physical standards for Air Force service recently elaborated according to the most recent aeromedical studies are shown. In part two the results are reported of statistical research carried out in three groups of 500 pilot applicants each. Thirty-five parameters, morphological, physiological, psychophysiological, physical and specialistic were considered for each individual. Mean values, standard deviations, significance of means difference and correlation indices give useful information of psychophysiological characteristics of the applicants. Tables showing diseases and anomalies which disqualify, the percentage of multiple causes, the changes of some causes in different groups, reliance and uniformity of selection standards were reported. A close examination of the results from respiratory and cardiocirculatory functions was made, and maximal changes in the time of the mean values of some respiratory data were considered. In part three general and specialistic diagnosis problems are shortly surveyed, and results and possible new techniques that could improve and facilitate AF personnel selection were discussed.

A68-81193
MONAURAL PHASE EFFECTS IN AUDITORY SIGNAL DETECTION.

J. E. Fricke (Lancaster Cleft Palate Clin., Pa.).

Journal of the Acoustical Society of America, vol. 43, Mar. 1968, p. 439–443. 12 refs.

A complex signal composed of a fundamental (525 c.p.s.) and a second harmonic (1050 c.p.s.) was created by systematically altering the phase of the second with respect to the first through six relative-phase relationships (0°, 30°, 60°, 90°, 120°, and 150°). Four 100-msec. bursts of noise, one of which contained the complex waveform, were presented to four subjects; and they were forced to choose which of the four contained the signal. Ten different signal-to-noise ratios (S/N), covering a range of 10 db around a subjective "threshold" value, were utilized. Forty judgments at each of these S/N ratios were made in each phase condition. The data revealed differences with regard to the detectability of the complex signal as a function of the relative phase of the components.

A68-81194
RADIOLOGICAL PROFILE OF THE MODERN JET PILOT [IL PROFILO RADIOLOGICO DEL MODERNO PILOTA DI AVIOGETTI].

P. Italiano (Ist. Med.-Legale per l'A.M. "A. Mosso", Milan, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 160–175. 11 refs. In Italian.

The writer proposes, in order to ascertain the necessary psychophysiological fitness, to implement the routine examination for candidate pilots with a series of photofluorographic studies. Beside the thorax examination he proposes to study the skull (in two projections, lateral and semiaxial), the vertebral column (in two orthogonal projections), the abdomen (direct study with subject standing), the esophagus and stomach (partially and totally filled). This series of examinations could be carried out in a short time and at small expense, by enlarging the existing photofluorographic sections.

A68-81195
PSYCHOPHYSIOLOGICAL CONDITIONS OF ASTRONAUTS AS DEDUCED FROM SPACE-GROUND RADIO COMMUNICATIONS [DATI SULLE CONDIZIONI PSICOFISIOLOGICHE DEI PILOTI SPAZIALI DESUMIBILI DALLE COMUNICAZIONI RADIO VERBALI SPAZIO-TERRA E TERRA-SPAZIO].

A. Judica-Cordiglia.

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 176–182. In Italian.

After a short introduction on astronaut control in space flight, by means of complex equipment connecting the space cabin and ground stations, the importance and value of space-ground voice communications in normal and particular situations are pointed out. Surveys of medical recording techniques, and symptoms noticeable during voice communications, concerning mainly body organs more likely damaged by the space cabin environment, unnatural to human beings, are stressed. Some space-ground voice communications are reported as examples. The ones recorded in emergency situations are clearly demonstrative. The emotional stresses influencing the astronaut, caused by exogenous and endogenous stimuli are studied. The importance of space-ground and ground-space communications allowing to intervene in time with proper actions (suggestions, orders etc.) as well as to know the astronaut's behavior and adaptation during space flight are stressed.

A68-81196
STUDY OF NA^{22} DISTRIBUTION IN THE FROG ENDOLYMPH AND PERILYMPH BEFORE AND AFTER NEGATIVE ACCELERATION [RICERCA SULLA DISTRIBUZIONE DEL NA^{22} NELL'ENDOLINFA E NELLA PERLINFA DI RANA PRIMA E DOPO ACCELERAZIONI NEGATIVE].

R. Caporale, C. Borghesan, and C. Bramati (Centro di Studi e Ric. di Med. Aeron. e Spaziale; Ispettorato di Sanita' Aeron.; and Rome, U., Clin. Ortorinolaringoiatrica, Rome, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5–8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 188–206. 31 refs. In Italian.

To study, by means of radio isotopes the diffusion characteristics of known chemical elements in labyrinth fluids, the passage of Na^{22} (injected previously as NaCl) through the blood and saccular perilymph and endolymph of *Rana esculenta*, was investigated. The aim of this research was to establish the relationship, if any, of radio sodium diffusion in cat, guinea pig and pigeon (studied by other authors) and in the frog, as well as to allow a further possible contribution to the identification of the mechanism of labyrinth fluid production. Furthermore, after having studied the behavior of the cited element in normal animals, possible changes of Na ion concentration in animals subjected to acceleration had to be investigated. The research was carried out on 100 frogs, injected with Na^{22}, samples of their labyrinth fluids were collected at pre-established time. The radioactive level was determined with a scintillation counter. Twenty-four hr. after injection, a group of animals was subjected to 10 G_z acceleration, for five min., before sampling. The sodium blood level was established; it increased rapidly during six hr. then started to decrease slowly. A similar reaction was observed in the perilymph, with a slower increase the maximum reached after 24 hr. In the endolymph the increase was more gradual and attained lower levels. In centrifuged animals, sodium concentration increased markedly, in the endolymph, with smaller changes in the blood and perilymph.

A68-81197
PHOTOMETRIC STANDARDIZATION OF VISUAL ACUITY TESTS IN AIR FORCE PERSONNEL SELECTION [IMPORTANZA DELLA STANDARDIZZAZIONE DELLE CARATTERISTICHE FOTOMETRICHE DEI TESTS D'ACUTEZZA VISIVA PER LA SELEZIONE DEL PERSONALE AERONAUTICO].

G. Durazzini (Ist. Med.-Legale l'A.M. "A. Mosso", Milan, Italy).

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5-8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 208-216. 11 refs. In Italian.

Visual acuity examinations are usually carried out in very different illumination conditions. The importance of exact and reliable evaluation of visual acuity, in routine review, selection of military personnel and in medico-legal practice are pointed out; accurate photometric studies of visual acuity tests, and of the examination surroundings should be carried out. Clinical and technical aspects of the subject in medical literature are quoted; the most severe standardizations of techniques and methods of visual acuity examination are necessary to obtain constant results wherever the examination takes place. In order to obtain an actual standardization it will be necessary, as described in the paper, to consider numerous physical factors affecting the test, the examination premises and the physiological factors affecting the individual examined. After consideration of some possible solutions (dark room, half dark room), the use of an apparatus made with a cylindric tube, of suitable size, one edge fitting the face, the other edge closed with a transparent optotype is suggested; the illumination will be provided by an artificial source, equipped with a tension regulator and a photometer controlling the luminous flux constance. This system can provide sufficient isolation of the subject from the surroundings and constant photometric values inside. It is of easy construction, relatively inexpensive and not encumbering, fitting its purpose.

A68-81198
INCIDENCE OF CARDIAC NONPHYSIOLOGICAL FINDINGS, IN YOUNG FLIGHT ASSISTANT CANDIDATES. CLINICAL, ELECTROCARDIOGRAPHIC, PHONOCARDIOGRAPHIC AND LABORATORY STUDY [SULL'INCIDENZA DI REPERTI CARDIACI NON FISIOLOGICI IN GIOVANI CANDIDATI ASSISTENTI AL VOLO. CONTRIBUTO CLINICO, ECGFONOCARDIOGRAFICO E DI LABORATORIO].

G. Dal Fabbro and M. S. Angeli.

(Ital. Assn. of Aeron. and Space Med., Conf., San Remo, May 5-8, 1966).

Rivista di Medicina Aeronautica e Spaziale, vol. 29, Suppl., Dec. 1966, p. 217-223. 24 refs. In Italian.

The writers report a study carried out on 100 young subjects of both sexes (78 women and 22 men) aged 21-28 yr. flight assistant candidates of Alitalia. The statistical study dealt with clinical examination, electrocardiography (ECG) and a phonocardiography before and after a Master test. A standard chest radiogram and telecardiogram were also taken. Heart diameter calculations were also reported. The clinical study was completed with current laboratory analysis (blood sedimentation rate, uranalysis, blood nitrogen and sugar levels). The conclusions attained by the writers pointed out that 9% of these candidates showed nonphysiological cardiac anomalies. A diastolic murmur, increase of the presystolic intensity, in the mitral area, and intensification of the second pulmonary valve sound; increase of cardiac diameters, microscopic hematuria, and diastolic blood pressure higher than normal, were frequently reported.

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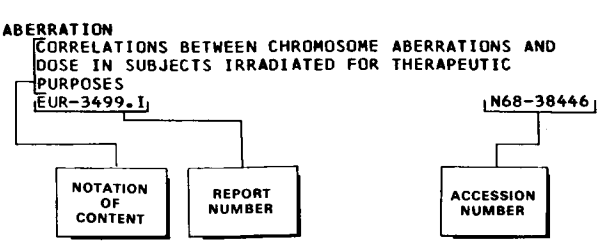

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VISUAL FIXATION AND UNCERTAINTY EFFECTS ON HUMAN REACTION TIME AT CONTROL PANEL
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SAFETY INSTRUMENTATION PACKAGE FOR PERSONS WORKING

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Personal Author Index

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AERE-R-4669, N68-21219

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